

ÄKTA flux™ S

Operating Instructions

Original instructions

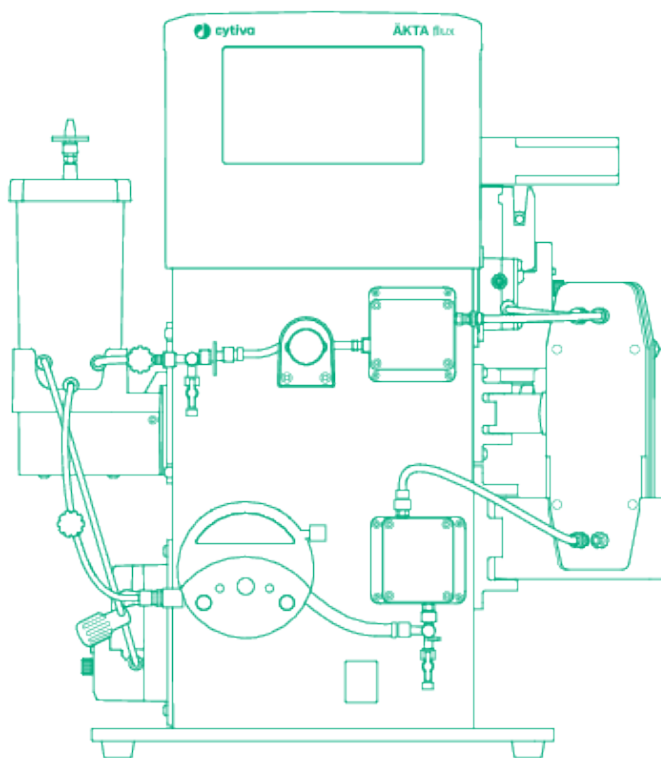


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1 Introduction

About this chapter

This chapter contains important user information, associated documentation, and intended use of ÄKTA flux™ s filtration system.

In this chapter

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1.1 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 ÄKTA flux s

ÄKTA flux s is a cross flow filtration (CFF) system. It is intended for use in a laboratory environment for research and educational purposes.

The system is configurable for operating hollow fiber cartridges suited for microfiltration applications, such as cell clarification/harvesting, or cassettes/hollow fibers for ultrafiltration applications, such as protein concentration and diafiltration in downstream unit operations.

ÄKTA flux s is not intended for diagnostic purposes.

Prerequisites

In order to operate ÄKTA flux s safely and according to the intended purpose, the following prerequisites must be met:

- You must be acquainted with handling of biological materials.
- You must read and understand the Safety instructions chapter of these *Operating Instructions*.
- The system must be installed according to the instructions in [Chapter 5 Installation, on page 63](#).

1.2 About this manual

Introduction

This section contains information about the purpose and scope of this manual, notes and tips, and typographical conventions.

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

This manual is valid for the ÄKTA flux s instrument.

Illustrations

All illustrations in this document are for reference purpose only. It can differ from the actual instrument.

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.*

Typographical conventions

The text on a graphical user interface is identified in this manual by ***bold italic*** text.

The text on the label of a hardware item is identified in this manual by **bold** text.

Tip: *The text can include clickable hyperlinks to reference information.*

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.

User documentation for ÄKTA flux s

The user documentation is listed in the table below.

Translations of the *Operating Instructions* are provided on the User Documentation CD together with the *User Manual*, *Product Documentation*, and *Unpacking Instructions*. Printed copies of the *User Manual* are available on request from Cytiva.

Documentation	Main contents
<i>ÄKTA flux s Operating Instructions</i> (this document)	Instructions needed to prepare and operate the ÄKTA flux s system in a correct and safe way. System overview, site requirements, and instructions for moving the system within the same building. Instructions for basic maintenance and troubleshooting.
<i>ÄKTA flux s User Manual</i>	Additional information in order to get the optimal performance from the system. Functional description of modules. Instructions for maintenance and troubleshooting activities.
<i>ÄKTA flux s Site Preparation Guide</i>	Information needed to prepare the site for installation and use of the ÄKTA flux s system.
<i>ÄKTA flux s Unpacking Instructions</i>	Instructions for handling the delivery package and unpacking the ÄKTA flux s system.
<i>ÄKTA flux s Product Documentation</i>	Specifications and material conformity.

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/aktaflux .
2	Select ÄKTA flux s from the list.
3	Click Related Documents .
4	Select to download the chosen literature.

Access user documentation online

Scan the QR code or visit cytiva.com/instructions. Enter the title or the document number to access the file.



1.4 Additional user documentation - additional/specific documentation

System-specific documentation

In addition to the *Operating Instructions* manual, the documentation package supplied with ÄKTA flux s also includes one or more Product Documentation binders containing detailed specifications and traceability documents.

The most important documents in the documentation package, with regard to technical aspects of ÄKTA flux s, are listed in the table below.

Document	Abbreviation	Purpose/Contents
Assembly Drawing	AD	Physical layout. Provides all dimensional data.
Piping and Instrument Diagram	P&ID	Schematic overview of the entire process flow, all components and instruments and the control system.
Declaration of Conformity	DoC	Declaration of Conformity for EU and/or other regions.
General Specification	GS	Technical data for the system
Equipment Data Sheet	EDS	Technical data for the system.
Equipment List	EQL	Description of process-related components, including wetted materials and specifications.
Spare Part List	SPL	List of spare parts available from Cytiva.
Functional Specification	FS	Software function description.

Component documentation

Documentation for components produced both by Cytiva and by a third-party are, if existent, also included in the Product Documentation.

2 Safety instructions

About this chapter

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

In this chapter

Section	See page
2.1 Safety precautions	12
2.2 Labels and symbols	22
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Important



WARNING

All users must read and understand the entire contents of this general safety chapter, and the specific safety precautions information in each subsequent chapter of this manual to become aware of the hazards involved.

2.1 Safety precautions

Introduction

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

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

- *General precautions, on page 13*
- *Personal protection, on page 13*
- *Flammable liquids and explosive environment, on page 14*
- *Installing and moving the system, on page 15*
- *Power supply, on page 17*
- *Operation, on page 18*
- *Maintenance, on page 19*

Definitions

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.

General precautions



WARNING

Operation and user maintenance of ÄKTA flux s must be performed by properly trained personnel only.



WARNING

Do not operate the product in any other way than as described in the user documentation.



WARNING

Risk assessment. Perform a risk assessment for the process or process environment. Evaluate the effects the use of the product and the operational processes can have on the classification of the hazardous area. The process can cause the hazardous area to increase or the zone classification to change. Implement the risk reduction measures needed, including use of personal protective equipment.



CAUTION

The product is designed for indoor use only.



CAUTION

Always use appropriate personal protective equipment when decommissioning the equipment.

Personal protection



WARNING

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

**WARNING**

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

**WARNING**

In ÄKTA flux s, prevent fluid leakage by tighten the Luer connection firmly. Do not open the Luer connection by twisting, bending or vibration. Do not open connectors when pressurized or during on-going process.

**WARNING**

Use fume mask during tank opening when processing hazardous liquids, to avoid possible exposure to aerosols.

**CAUTION**

Risk of pinching by moving parts inside the tank or inside the pumps. Do not insert your fingers or other objects into the tank or other moving parts while ÄKTA flux s is powered.

Flammable liquids and explosive environment

**WARNING**

ÄKTA flux s is **not approved** to handle flammable liquids.

**WARNING**

ÄKTA flux s is **not approved** for work in a potentially explosive atmosphere, in areas classified as Zone 0 to Zone 2 according to IEC 60079-10 2002. ÄKTA flux s does not fulfill the requirements of the ATEX Directive.

**WARNING**

Some of the chemicals used with the product can be flammable under certain conditions. Make sure to use chemicals only under conditions where they are not flammable. Refer to local and/or national classifications of flammable liquids.

Installing and moving the system

**CAUTION**

Before moving ÄKTA flux s the following must be done:

1. Empty ÄKTA flux s.
2. Shut down ÄKTA flux s and disconnect the power cord.

**WARNING**

Access to power switch and power cord. The power switch must always be easy to access. The power cord must always be easy to disconnect.

**WARNING**

Disconnect power to the product before installation of the optional pump.

**WARNING**

Before connecting the filter to ÄKTA flux s, 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 of the filter.

**CAUTION**

Handle tank with care.

- Make sure the tank is not damaged or dropped during handling.
- Do not install or remove the tank in any other way than described in this manual.

**CAUTION**

Whenever packing, unpacking, transporting or moving ÄKTA flux s, wear:

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

**CAUTION**

Do not transport, handle and store ÄKTA flux s in any other way than described in this manual.

**CAUTION**

Two persons are required to lift ÄKTA flux s. Lift only in the bottom part of the system.

**CAUTION**

Make sure that the system is placed on a stable, level bench with adequate space for ventilation.

**CAUTION**

Make sure your fingers not are pinched under ÄKTA flux s when the instrument is placed onto a bench.

**CAUTION**

Use only tubing supplied by Cytiva.

**CAUTION**

Avoid that the filter falls when installing filters.

- Handle filter with care.
- Do not install or remove the filter in any other way than described in this manual.

**CAUTION**

Make sure that the USB port is protected from moisture and liquid by always having a protective cap on.

Power supply**WARNING**

National Codes and standards (NEC, VDE, BSI, IEC, UL etc.) and local codes outline provisions for safely installing electrical equipment. Installation must comply with specifications regarding wire types, conductor sizes, plugs, branch circuit protection and disconnect devices. Non-compliance can result in personal injury and/or equipment damage.

**WARNING**

All electrical installations must be performed by authorized personnel only.

**WARNING**

The supply voltage must correspond to the markings on the system.

**WARNING**

ÄKTA flux s must always be connected to a grounded power outlet.

**WARNING**

Only use grounded power cords delivered or approved by Cytiva.

**WARNING**

Always disconnect power to ÄKTA flux s before replacing fuses.

Operation



WARNING

Do not use the product if it is not working correctly, or if it has suffered any damage, including:

- damage to the power cord or its plug,
- damage caused by dropping the product,
- damage caused by splashing liquid onto the product.



WARNING

All alarm signals must be set within the limits specified in the system documentation. Pressure and temperature control must be activated while the system is in use to prevent the tubing system to leak or break.



WARNING

Never exceed the operating limits stated in this document and on the system label. Operation of the product outside these limits can damage equipment and cause personal injury or death.



WARNING

Disconnect power to the product before installing the pump tubing.



WARNING

Before connecting the filter to ÄKTA flux s, 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 of the filter.



WARNING

Make sure that the filter is installed according to instructions for use of the filter.



WARNING

Never block the outlet tubing and/or the check valves outlet with, for example, stop plugs, since this will create overpressure or hardware failure and can result in injury.



WARNING

Make sure integrity of flowpath through pre-run with harmless liquids before use and sanitization.



CAUTION

Let the ÄKTA flux s cool down after use as the components and internal compartments can become hot during use.



CAUTION

Handle fluids with care when adding fluid to the system or collecting fluid from drain valves. Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.



CAUTION

Make sure the control valve is released when there is no active filtration.

Maintenance



WARNING

Electrical shock hazard. All repairs must be done by service personnel authorized by Cytiva. Do not open any covers or replace parts unless specifically stated in the user documentation.

**WARNING**

Disconnect the power supply to the system before performing any form of maintenance on ÄKTA flux s. Only personnel authorized by Cytiva may perform maintenance other than maintenance procedures described in ÄKTA flux s user documentation. The power supply unit contains high voltage that may cause injury or death.

**WARNING**

Maintenance should be scheduled regularly with Cytiva to assure a proper function of the system.

**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**

When using hazardous chemicals, run **System CIP** and **Membrane CIP** to flush the entire system, including filters, with distilled water until a pH of approximately pH 7.0 is reached, before performing service or maintenance.

**WARNING**

Hazardous substance. Wear suitable PPE when using hazardous chemicals. Take care to avoid spillage.

**WARNING**

Periodically inspect the system's tubing, gaskets, seals, and connections for wear and damage to prevent leaks and the release of potentially hazardous fluids.



WARNING

Before maintenance/service is performed, the system owner must first clean the system and complete a Health & Safety Declaration Form. Contact Cytiva for further information.



WARNING

To avoid personnel being exposed to potentially hazardous substances, make sure that the column is properly decontaminated and sanitized before maintenance or service.



WARNING

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



CAUTION

To prevent exposure to leaking hot fluids:

- Do not use non-approved tubing and components together with or inside the system.
- Maintenance and pump tubing replacement of the ÄKTA flux s must be scheduled on regular basis with a Cytiva representative and performed by properly trained personnel only.
- Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.



CAUTION

Changing of tubing exposes operator to residual fluid that might cause contamination of skin and clothing. Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.

2.2 Labels and symbols

Introduction

This section describes the nameplate, labels, and other safety and regulatory labels and symbols.


Nameplate

The nameplate provides information about the model, manufacturer, and technical data.

System label

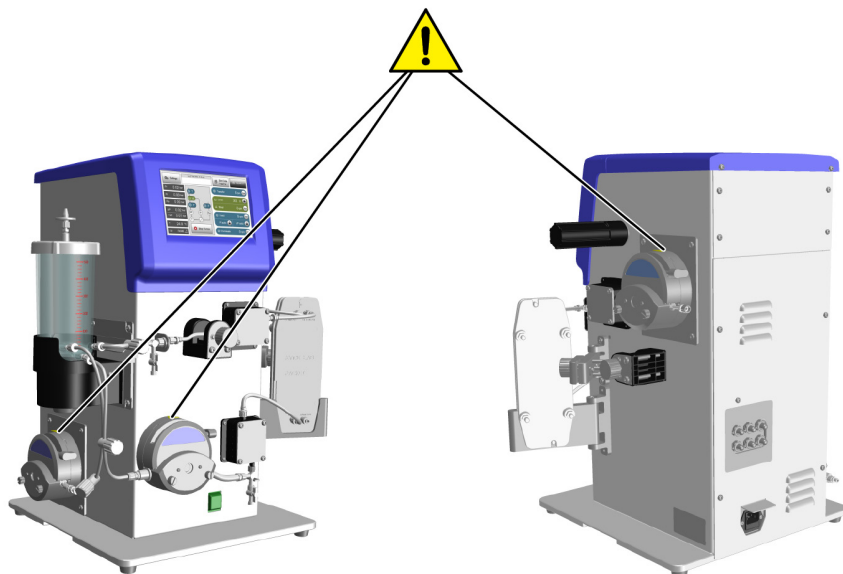
The system label is located on the back of the equipment. The system label identifies the equipment and shows electrical data, regulatory compliance, and warning symbols.

The system label information is explained in the table below.

Label text	Description
Code no	System code number
Serial no	System serial number
Mfg Year	Manufacturing year and month
Voltage	Supply voltage
Frequency	Supply voltage frequency
Max power	Max power consumption
Fuse	System fuse
Protection class	Protection class, ingress protection according to IEC 60529. This covers the electric cabinet only.
	Warning! Read the user documentation before using the system. Do not open any covers or replace parts unless specifically stated in the user documentation.

Safety label

The warning label on the pumps indicates that the fingers must be kept away from the moving rotor.



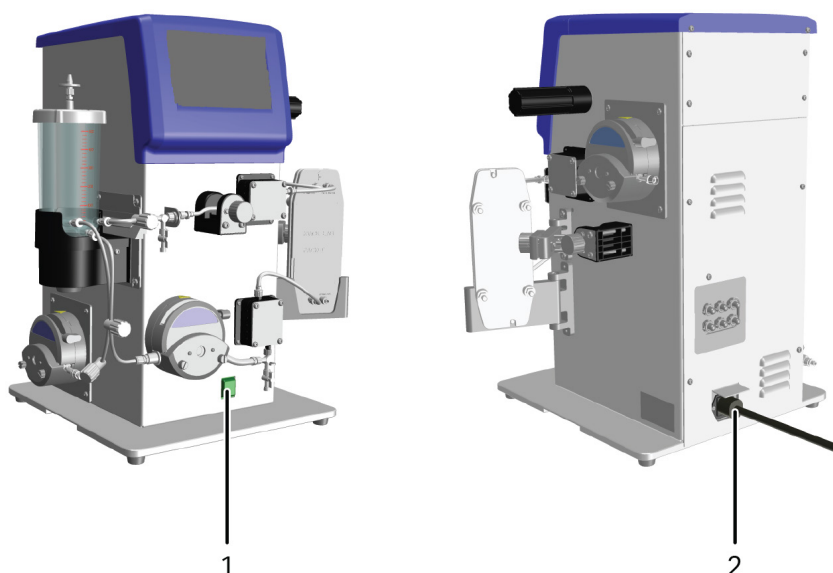
2.3 Emergency procedures

Introduction

This section describes how to do an emergency shutdown of ÄKTA flux s, and the result in the event of power failure.

The section also describes how to restart the system after emergency shut down or power failure.

Emergency shutdown



Switch off the mains power supply by pushing the power switch to the **0** position (1), or disconnecting the power cord (2).

Result: Power is cut off from the entire system and data is lost or corrupt.

Note: Any user, irrespective of authority access can perform an emergency shut-down by pressing the **Stop all pumps** button.

Restart after emergency shut down or power failure

Follow the instruction below to restart ÄKTA flux s after emergency shut down or power failure.

Step	Action
1	Make sure that the condition that caused the emergency stop or power failure is corrected.
2	<p>If the power has been lost: switch on power to ÄKTA flux s by turning on the power switch to the I position.</p> <p><i>Result:</i></p> <p>The system computer starts automatically.</p>
3	Restart the process.

3 System description

About this chapter

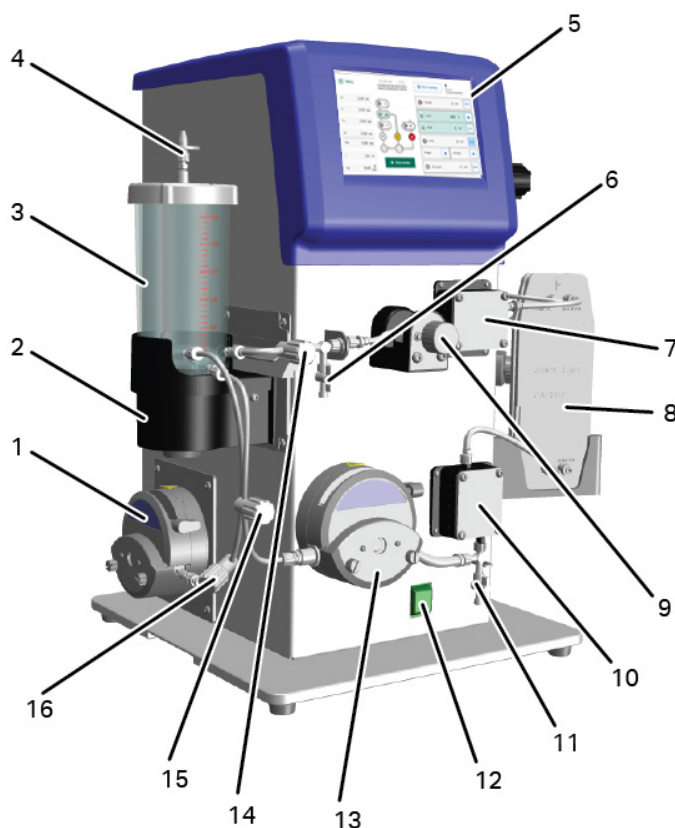
This chapter provides an overview of the technical properties of ÄKTA flux s.

In this chapter

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3.1 Illustrations of ÄKTA flux s

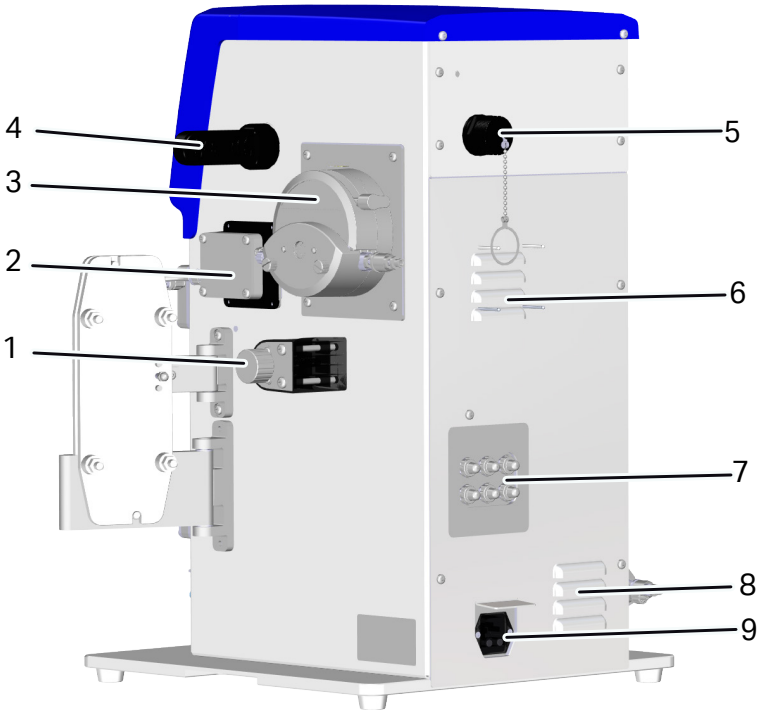
Front view with all options



Part	Function
1	Transfer pump (optional)
2	Tank holder with tank balance and motor for mixer
3	Tank
4	Air filter
5	Operator touchscreen
6	Upper drain valve
7	Retentate pressure sensor Pr
8	Filter holder for Centramate cassette shown (optional)

Part	Function
9	Retentate pressure control valve
10	Feed pressure sensor Pf and temperature sensor
11	Lower drain valve
12	Power switch
13	Feed pump
14, 15, and 16	Pinch clamps

Rear view with all options



Part	Function
1	Permeate pressure control valve
2	Permeate pressure sensor Pp (optional)
3	Permeate pump (optional)

Part	Function
4	USB-connector protection ¹
5	Ethernet port
6	Ventilation holes for cabinet cooling fan
7	Circuit breakers
8	Air inlet
9	Power cord connection and fuse drawer

¹ USB is used only by Cytiva service personnel.

3.2 System control

In this section

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3.2.1 Introduction

The ÄKTA flux s instrument is controlled from a built-in computer. The computer starts automatically when the power is switched on. The user interacts with the system through the touchscreen. The user needs to log in to the system with an username and password to operate the system, see [Section 5.4.8 Set up the system computer, on page 97](#).

The software functionalities are available to the user based on predefined access authority levels.

When a system warning or a system alarm happens, a sound is combined with a message on the touchscreen, for more information, see [Section 8.1 Configure Alarms screen, on page 166](#).

3.2.2 User Authority levels

The ÄKTA flux s instrument has three user authority levels. The software functionalities are available to the user based on predefined access authority levels. The table below lists the available functionalities for different user access levels.



Access allowed



Access not allowed

Functionality	User/Operator	Administrator	Service
General operation			
Shutdown	✓	✓	✓
Login	✓	✓	✓
Select, Run and Stop	✓	✓	✓
Install	✗	✗	✓
About	✓	✓	✓
User management			
Create, edit and delete user	✗	✓	✓
Modify user roles	✗	✓	✗
Reset password for users	✗	✓	✗
Change password	✓	✓	✓
Modify status of a user	✗	✓	✗
Data file management			
Save/ Send summary files	✓	✓	✓
Save log files (including system logs)	✓	✓	✓
Settings			
Set date and time	✓	✓	✓
USB management	✗	✗	✓
Alarms	✓	✓	✓
Configure	✓	✓	✓

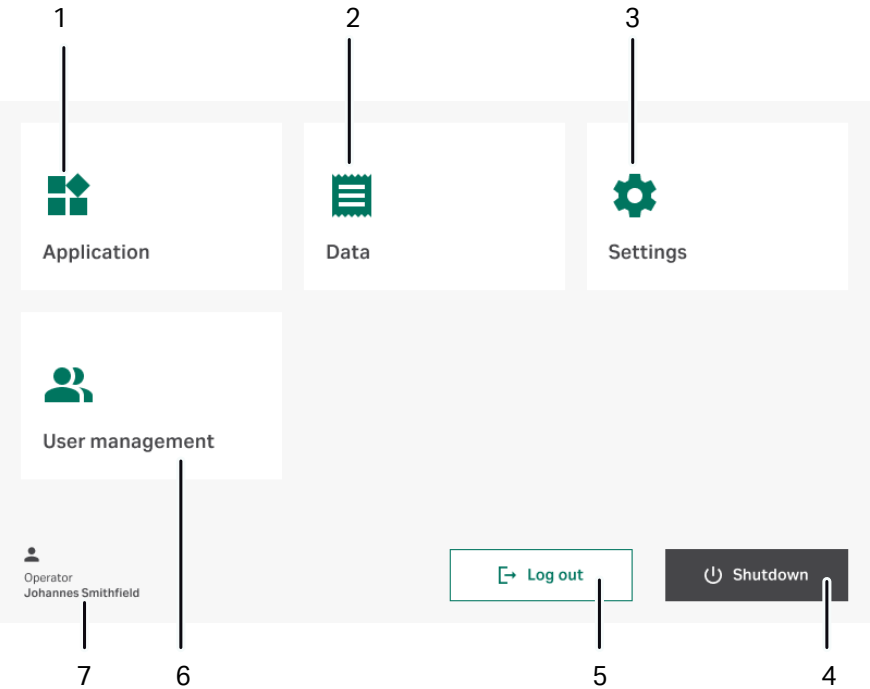
Functionality	User/Operator	Administrator	Service
Calibration	✓	✓	✓
Auto mode tuning	✓	✗	✓

The functionalities listed below are only available for Service user:

- View and use **Service** menu
- Maintenance
- Install software
- Configure Serial number
- Advance **Calibration** settings
- **Configure Hardware**

3.2.3 Main menu

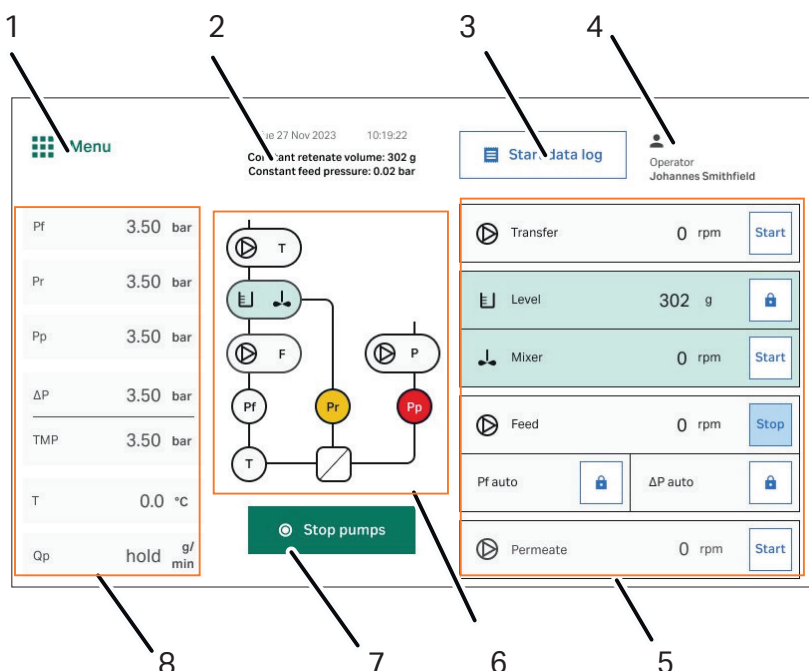
The illustration below shows the main menu of the instrument after login.



Part	Description	Function
1	Application	Access to all application protocols.
2	Data	Save log files, report files, support files, and print report files.
3	Settings	Access to Settings menu.
4	Shutdown	Shut down the instrument.
5	Logout	Log out from the active user account.
6	User Management	Manage user accounts.
7	User information	Displays information about the active user.

3.2.4 Application screen

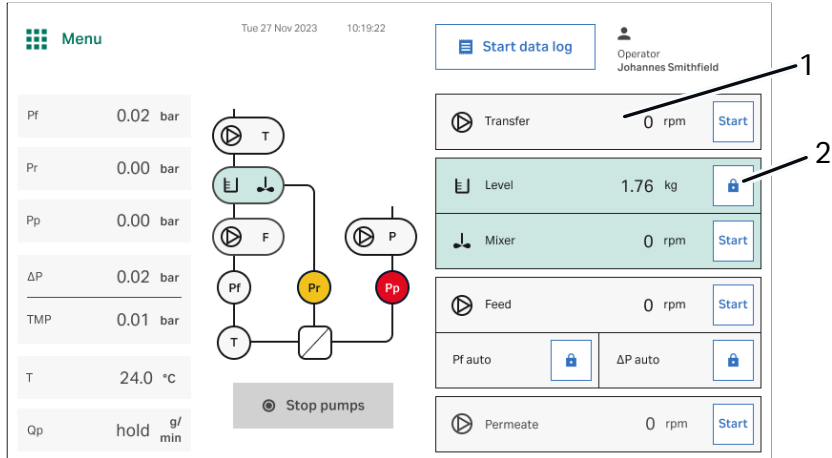
The illustration below shows the **Application** screen. To the right, the control panel allows the user to control a run. To the left, the parameter panel shows the status of parameters during a run. In the middle, the process flowchart shows the connected equipment.



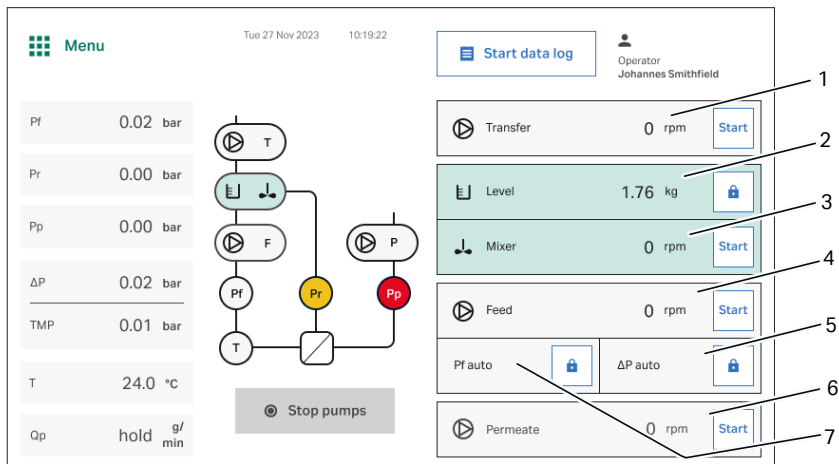
Part	Description	Function
1	Menu button	Return to the main screen.
2	Information panel	Displays active automated functions.
3	Start and Stop Data Logging button	Starts or stops data logging.
4	Operator	Displays information about the active user.
5	Control panel	Starts or stops operation functions.
6	Process flowchart panel	An overview of the system flowchart.
7	Stop Pumps button	Stops all pumps.
8	Parameter panel	Displays the process parameters.

Application screen with no optional pumps installed

If the optional pumps are not installed (1), they appear gray on the main screen. The **Lock** button (2) on the tank level control is dimmed and not possible to use.



Control panel








Part	Description	Function
1	Transfer	Adjusts the transfer pump (optional) and displays transfer pump rotation speed or flow rate.
2	Level	Adjusts level control and displays amount of fluid in the tank.
3	Mixer	Adjusts the mixer and displays rotational speed of the mixer.
4	Feed	Adjusts the feed pump and displays feed pump speed, flow rate or shear rate.
5	ΔP auto	Used to set retentate ΔP (Pf minus Pr) to be kept constant by controlling feed pump speed, flow rate or shear rate.
6	Permeate	Adjusts the permeate pump (optional) and displays permeate pump speed or flow rate.
7	Pf auto	If enabled, Pf auto controls the feed pump speed with automated feed pressure control.

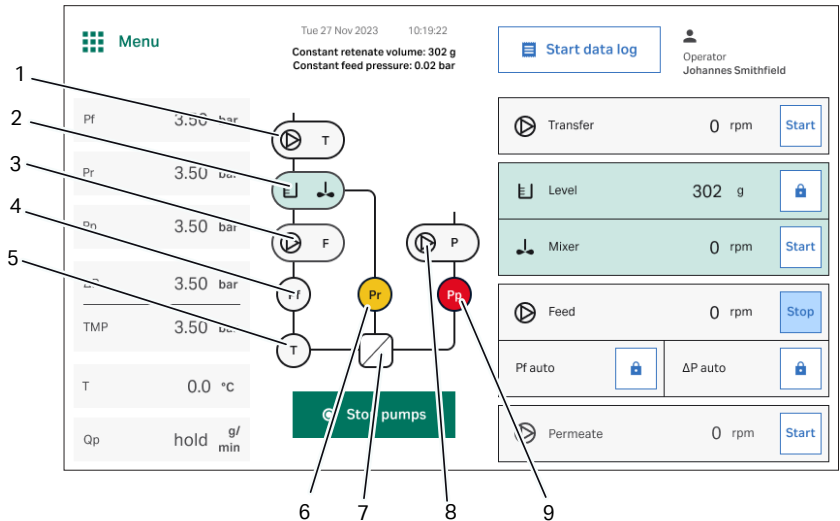
Buttons

The control panel includes the following command buttons:

Button	Description
	A Start button with surrounding blue circle indicates that the parameter is not active.

Button	Description
	<p>A Stop button with a surrounding green circle indicates that the parameter is active.</p> <p>The Start button automatically changes to a Stop button when a pump is started.</p>
	<p>A Start button with a surrounding red circle indicates the Stop Pumps button has been pressed.</p>
	<p>The Lock button indicates an automatic parameter. A Lock button with surrounding blue circle indicates that the parameter is not active.</p>
	<p>The Lock button with a surrounding green circle indicates an active parameter.</p>
	<p>When the Lock button is dimmed the function is not activated (option).</p>







Process flowchart panel



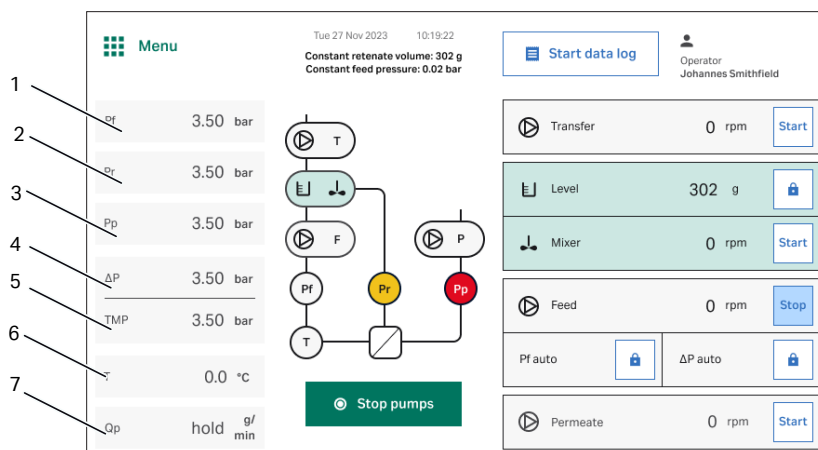
Part	Function
1	Transfer pump (optional)
2	Mixer and tank
3	Feed pump
4	Feed pressure sensor (Pf)
5	Temperature sensor
6	Retentate pressure sensor (Pr)
7	Filter
8	Permeate pump (optional)
9	Permeate pressure sensor (Pp) (optional)

Indicators

The process flowchart panel includes the following indicators:

Indicator	Description
	A blue circle around the motor symbol indicates that the pump is not running.
	A green circle around the motor symbol indicates that the pump is running.
	A yellow circle around the motor symbol indicates a pump warning.
	A red circle around the motor symbol indicates a pump alarm.
	A yellow sensor indicator is used for a warning.
	A red sensor indicator is used for an alarm.

Parameter panel



Part	Symbol	Function
1	P_f	Displays feed pressure
2	P_r	Displays retentate pressure
3	P_p	Displays permeate pressure
4	ΔP	Displays Δ pressure $\Delta P = P_f - P_r$
5	TMP	Displays transmembrane pressure $TMP = [(P_f + P_r)/2] - P_p$
6	T	Displays system temperature
7	Q_p	Calculated permeate flow

3.2.5 **Settings** menu

The **Settings** menu is available for all users.

Function	Description
USB device	Available to Service user only.
Alarms	Configure and set process and system alarms. See Section 8.1 Configure Alarms screen, on page 166 .
Configure	Configure the run parameters. See Section 8.2 Configure System screen, on page 170 .
Calibration	Calibrate the pumps, pressure sensors, and tank level. See Section 8.3 Calibration screen, on page 173
System information	Provides information about different parts of the system. See Section 8.2 Configure System screen, on page 170 .
Auto mode tuning	Enables control of automated features. See Section 7.2.2 Automated features, on page 146

3.3 Standard equipment

Introduction

This section provides an overview of the standard components of ÄKTA flux s.

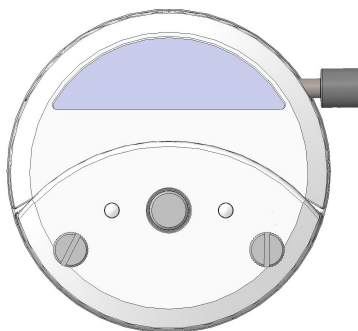
In this section

Section		See page
3.3.1	Feed pump, pressure sensors and pressure control valve	44
3.3.2	Tank	46
3.3.3	Communication connection	47

3.3.1 Feed pump, pressure sensors and pressure control valve

The feed pump

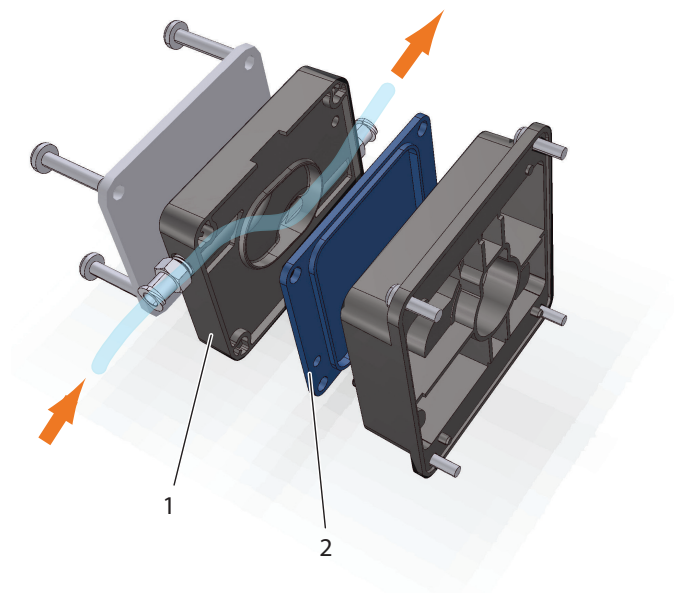
A peristaltic feed pump used in the feed line. The optional pumps used in the transfer and permeate lines are of the same type.



Pressure sensors

The feed pressure sensor, **Pf**, and the retentate pressure sensor, **Pr**, are both used in the recirculation loop, see [Section 4.1 Recirculation loop, on page 56](#). The permeate line can be equipped with an optional permeate pressure sensor.

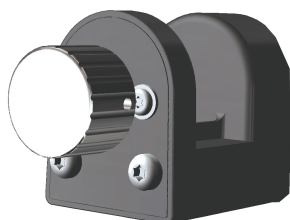
Liquid flows between the housing (1) and the diaphragm (2).



Pressure control valves

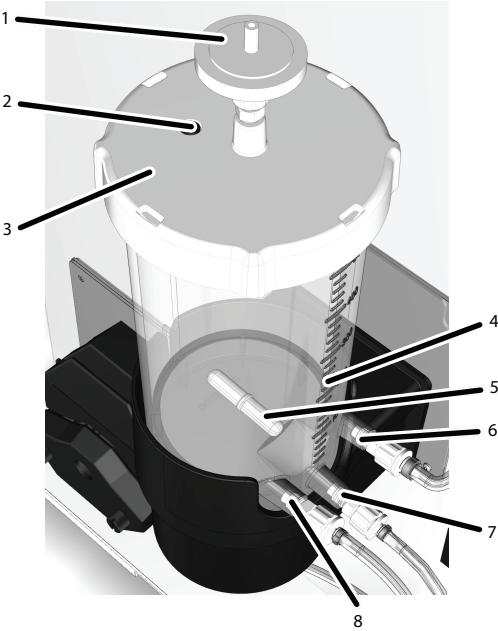
There are two pressure control valves installed on the instrument:

- The retentate pressure control valve, used in the retentate line, enables manual regulation of the liquid flow by adjusting the pressure upstream the filter. The entire retentate line can be shut off by closing the retentate pressure control valve.
- The pressure control valve, placed on the permeate side of the instrument, is used to shut off the permeate filter outlet, and be used to manually control the permeate pressure.



3.3.2 Tank

Illustration



Part	Description
1	Air filter
2	Check valve
3	Tank lid
4	Level indication
5	Magnetic stir bar
6	Retentate inlet
7	Feed outlet
8	Transfer inlet

Description

ÄKTA flux s has a 0.5 liter tank. The tank has a feed outlet, transfer and retentate inlets. It is equipped with a check valve and an air filter.

The volume in the tank is calculated on the basis of the weight. The weight is measured with a tank balance. The tank is equipped with a magnetic stir bar.

3.3.3 Communication connection

Ethernet connection

The run data is transferred using an Ethernet connection. The instrument is connected to network drive through the Ethernet port at the back of the instrument (see [Rear view with all options, on page 28](#) for location of the Ethernet port). For more information about network configuration, see [Configure Network settings, on page 152](#).

USB

The USB port is available for use by the Service user only.

3.4 Optional equipment

Introduction

The sections below describe the optional equipment of the instrument.

Transfer pump

An optional transfer pump is available to set up the transfer line. The pump tubing needs to be ordered separately.

Permeate pump

An optional permeate pump is available to control the permeate flow. When using the permeate pump it is recommended to also include the optional permeate pressure sensor. The pump tubing needs to be ordered separately.

Permeate pressure sensor

An optional permeate pressure sensor is available to monitor the pressure in the permeate line. The pressure sensor is recommended when controlling the permeate pressure.

Centramate cassette holder

Centramate cassette holder is an option and is used with the Centramate cassettes.



3.5 Filter devices

Introduction

This section contains a description and an overview of the filter types that can be installed with ÄKTA flux s:

The following filter types can be used:

- Hollow fiber cartridges
- Filter cassettes

In this section

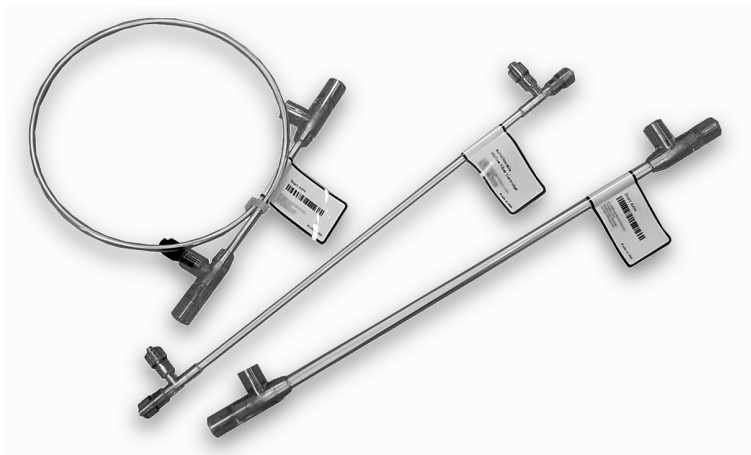
Section		See page
3.5.1	Hollow fiber cartridges	50
3.5.2	Centramate cassette and holder	51

3.5.1 Hollow fiber cartridges

Introduction

Hollow fiber cartridges can be used with ÄKTA flux s. Inlet and outlet filter tubing of correct dimensions and lengths can be ordered separately from Cytiva.

Illustration



Description

Hollow fiber (HF) cartridges can contain several hollow fiber lumens. Each fiber is open in both ends and the feed enters in one end and exits as retentate from the other end.

The size of the pores determines the filtering characteristics of the cartridge, that is, the cut-off size for particles that either will be retained or filtered out with the permeate.

The permeate penetrates the lumen's wall in the fibers and flows outside the fibers and is collected through one of the side connectors.

Available HF cartridges

ÄKTA flux s can be used with the Cytiva Hollow Fiber Cartridges MidGee™, Hollow fiber Start AXM, and Start AXH cross flow cartridges.

More information

- See [Section 6.1.2 Install hollow fiber cartridges, on page 112](#) for more information on how to install hollow fiber cartridges.
- Refer to *Hollow fiber cartridges for membrane separations Operating handbook CY28744* for more information.
- Contact Cytiva for more information about other hollow fiber cartridges that can be used with ÄKTA flux s.

3.5.2 Centramate cassette and holder

Introduction

Centramate packet and Kwick lab packet holder can be used with ÄKTA flux s. It is possible to attach up to three Centramate cassettes to the holder. Inlet and outlet filter tubing in correct dimensions and lengths can be ordered separately from Cytiva.

Illustration



Part	Function
1	Filter cassette
2	Kwick Lab packet holder (front plate)
3	Kwick Lab packet holder (back plate)

Description

The Centramate cassette is intended for concentration and diafiltration of small process volumes.

More information

- See [Section 6.2 Install Centramate cassette and holder, on page 116](#), for more information on how to install filter packet and holders.

3 System description

3.5 Filter devices

3.5.2 Centramate cassette and holder

- Refer to *Kvick lab packet holder User Manual 11000386*, for more information.
- Contact Cytiva for more information about other filter solutions that can be used with ÄKTA flux s filtration systems.

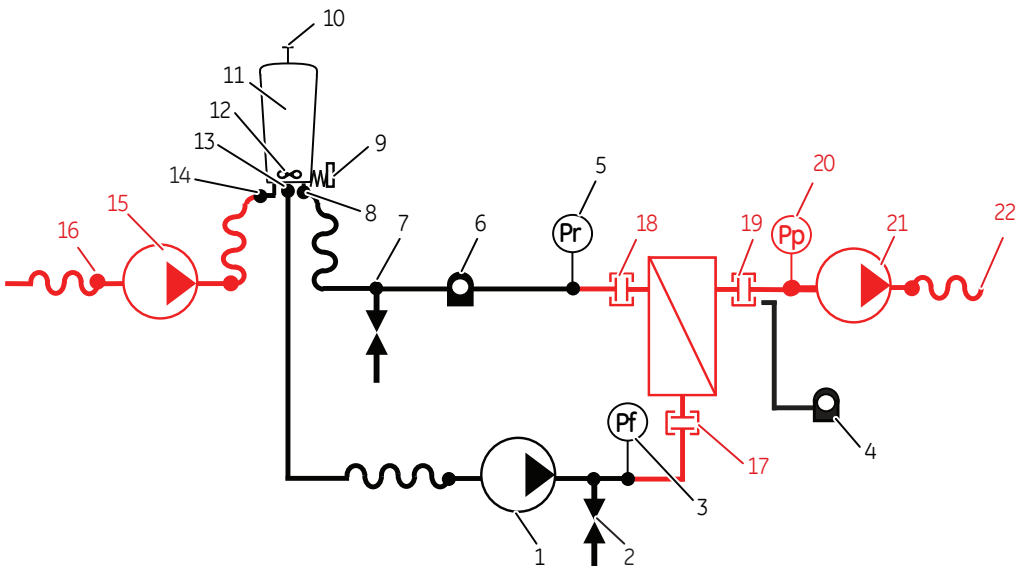
3.6 Flowchart

Introduction

This section contains a flowchart for ÄKTA flux s.

Flowchart illustration

The illustration below shows the flowchart for the ÄKTA flux s system. Black indicates standard components and red indicates optional components.



Process components

The following table lists the process components that are shown in the flowchart.

Part	Function
1	Feed pump
2	Lower drain valve
3	Feed pressure sensor Pf (equipped with a temperature sensor)
4	Permeate pressure control valve
5	Retentate pressure sensor Pr
6	Retentate pressure control valve

Part	Function
7	Upper drain valve
8	Retentate inlet
9	Tank balance
10	Air filter
11	Tank
12	Mixer
13	Feed outlet from tank
14	Tank transfer inlet
15	Transfer pump (optional)
16	External tank connection
17	Filter feed inlet
18	Filter retentate outlet
19	Filter permeate outlet
20	Permeate pressure sensor Pp (optional)
21	Permeate pump (optional)
22	Permeate outlet

4 Flow lines

About this chapter

This chapter provides an overview of the flow lines in ÄKTA flux s.

In this chapter

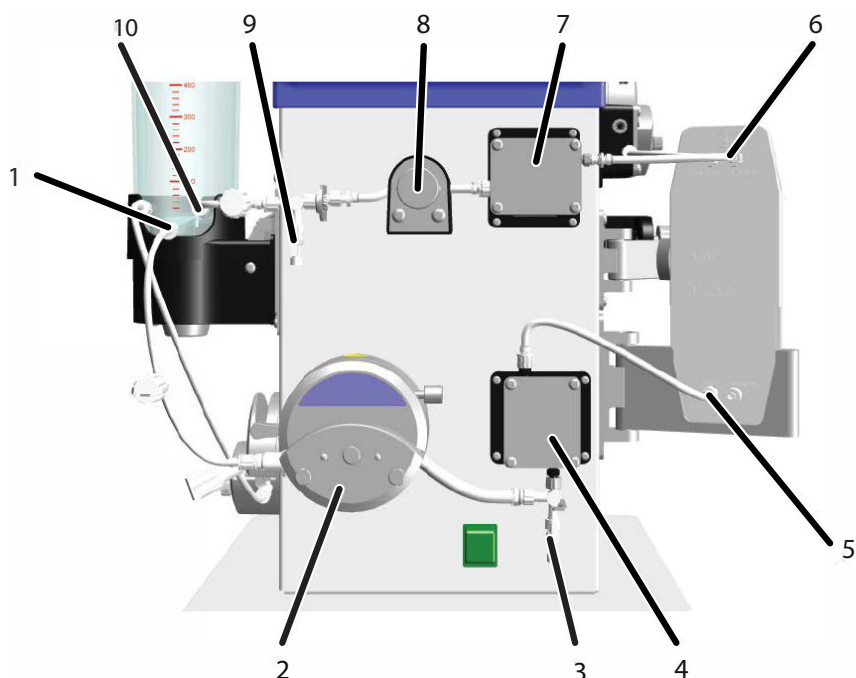
Section		See page
4.1	Recirculation loop	56
4.2	Permeate line	59
4.3	Transfer line	61

4.1 Recirculation loop

Introduction

The recirculation loop consists of the feed line and the retentate line.

Illustration



Part	Function
1	Feed outlet from tank
2	Feed pump
3	Lower drain valve
4	Feed pressure sensor Pf and temperature sensor
5	Feed inlet to filter
6	Retentate outlet from filter
7	Retentate pressure sensor Pr
8	Retentate pressure control valve
9	Upper drain valve

Part	Function
10	Retentate inlet to tank

Flow path

The feed line transfers liquid from the tank to the filter via the feed pump. The retentate with particles or molecules too large to pass through the filter pores is returned to the tank via the retentate line.

Drainage

There are two drain valves. The lower drain valve (before the filter) drains the tank without passing the filter. The upper drain valve (after the filter) enables flow over the filter without returning to the tank.

Flow control

The pressure sensor **Pf** provides pressure data for the filter feed inlet pressure and protects the system against overpressure. If the pressure sensor fails, an alarm will be triggered in the control system.

The **Pf** sensor housing also contains the temperature sensor.

The retentate outlet on the filter is connected to the retentate pressure sensor, **Pr**. The transmembrane pressure (TMP) over the filter is controlled via the opening and closing function of the retentate pressure control valve.

DeltaP

The retentate **ΔP** is the difference between the retentate pressure and the feed pressure.

$$\text{Formula: } \Delta P = P_f - P_r$$

where

Pf is feed pressure

Pr is retentate pressure

Transmembrane pressure

$$\text{Formula: TMP} = [(P_f + P_r)/2 - P_p]$$

where under ultrafiltration

P_p is 0 bar

P_f , P_r , and Δp are dependent upon filter and feed flow

P_f can be adjusted via controlling the feed flow or the back pressure in the recirculation line via the retentate pressure control valve placed after the filter.

The process is normally optimized to minimize the process time which is done by maximizing the flux, (permeate flow/filter area). To keep the flux at max possible over the whole process the combination(s) of flux versus TMP is normally studied for the start and end products of the process.

4.2 Permeate line

Introduction

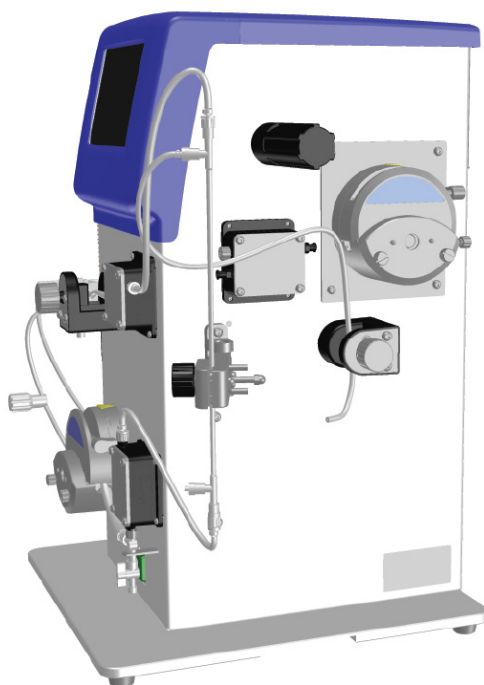
The permeate line carries the permeate that exits the filter through the permeate outlet.

Permeate flow control

Liquid containing particles or molecules small enough to pass through the filter pores is collected as permeate.

Permeate exits the filter through the permeate outlet on the filter.

The permeate pressure control valve, placed on the permeate side of the instrument, is used to shut off the permeate filter outlet and to manually control the permeate pressure.



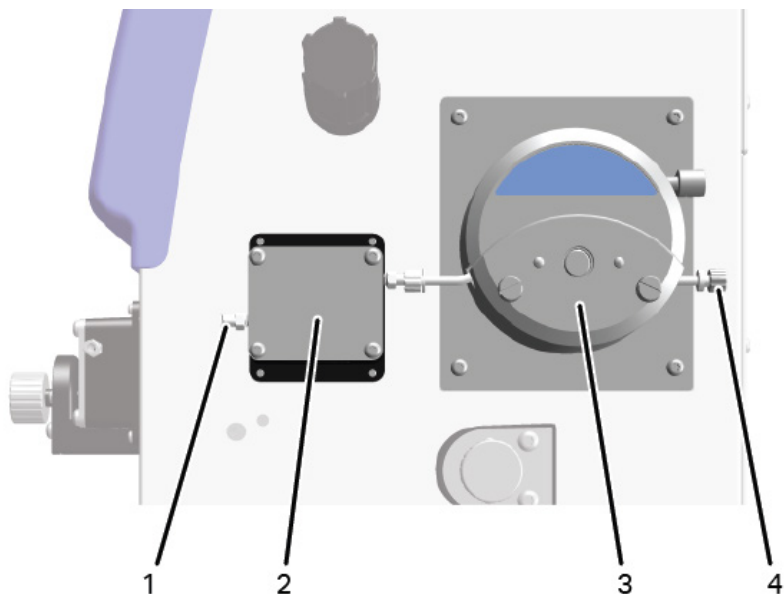
Recycling

The permeate outlet can be coupled to the tank. This allows permeate to be routed back to the tank when, for example, the process is set up and calibrated or during CIP.

Permeate recycling is also used when the objective is to run the system at steady state conditions, this can be applied during TMP scouting, for example.

Optional permeate equipment

The permeate line can be equipped with a permeate pump and a pressure sensor. The permeate pump is used to control the permeate flow rate and the permeate pressure sensor, **Pp**, measures permeate pressure.



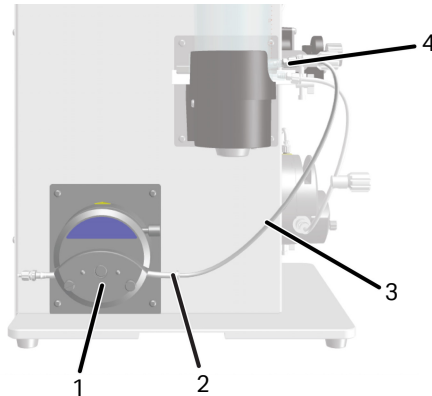
Part	Function
1	Permeate pressure sensor inlet
2	Permeate pressure sensor
3	Permeate pump
4	Tubing outlet permeate pump

4.3 Transfer line

Introduction

The transfer line requires the optional transfer pump.

Illustration



Part	Function
1	Transfer pump
2	Tubing outlet from transfer pump
3	Transfer line
4	Transfer inlet to tank

Description

The transfer line transfers liquid from an external tank to the ÄKTA flux s tank via the transfer pump.

Constant retentate volume

The retentate volume can be kept at a constant volume using the CRV functionality. During the filtration process, the tank volume is reduced due to removal of permeate at the membrane, resulting in a lower volume of the retentate flowing back into the tank. To maintain a constant tank volume, buffer is added using the transfer pump. The ÄKTA flux s instrument has automated CRV control.

The table below lists the parameters for the CRV control.

Parameter	Description
Tank volume	<ul style="list-style-type: none"> • Max.: 400 g • Min: 15 g
Offset	<ul style="list-style-type: none"> • Start[†]: 10 g • Stop[‡]: 20 g
Transfer pump speed [*]	100 rpm

[†] The transfer pump starts when the tank volume is below the set **Level** value from the above described offset start value.

[‡] The transfer pump stops when the tank volume is above the set **Level** value from the above described offset stop value.

^{*} The speed at which the transfer pump fills the tank.

5 Installation

About this chapter

This chapter provides required information to enable users and service personnel to unpack, install, move and transport ÄKTA flux s.

In this chapter

Section	See page
5.1 Site requirements	64
5.2 Unpack the ÄKTA flux s	65
5.3 Transport	67
5.4 Set up the ÄKTA flux s	68

Precautions



WARNING

Before performing any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in [Chapter 2 Safety instructions, on page 11](#).



CAUTION

Whenever packing, unpacking, transporting or moving ÄKTA flux s, wear:

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



CAUTION

Do not transport, handle and store ÄKTA flux s in any other way than described in this manual.

5.1 Site requirements

Summary of requirements

The following table gives a summary of power supply and environmental requirements.

Parameter	Requirement
Supply voltage	100-120/220-240 V AC, $\pm 10\%$
Phases	Single phase (with 3P ground pole)
Frequency	50 to 60 Hz
Maximum power	Nominally 400 W
Grounding	ÄKTA flux s must be connected to a grounded AC power outlet.
Ambient environment	Avoid: <ul style="list-style-type: none"> • Direct sunlight • Strong magnetic or electric fields • Vibrations • Corrosive gas • Dust
Positioning	The placement of the ÄKTA flux s must fulfill the following requirements: <ul style="list-style-type: none"> • A flat, stable and clean bench which can handle ÄKTA flux s weight at fully loaded conditions. • Sufficient space at all sides of the ÄKTA flux s when installed at the intended production location to allow convenient working conditions.
Computer	Built-in computer
Location	Indoor use only

5.2 Unpack the ÄKTA flux s

Introduction

This section describes the requirements for receiving the delivery box and storing the instrument before installation. It also describes the safety precautions that must be taken when unpacking the instrument.

The unpacking instruction is attached to the delivery box for ÄKTA flux s, refer to *Unpacking instructions* (29056121).

Storage requirements

The delivery box should be stored in a protected place indoors. The following storage requirements must be fulfilled for the unopened boxes:

Parameter	Allowed range
Ambient temperature, storage	-25°C to +50°C See detailed information in Operating limits, on page 202 .
Relative humidity	Up to 95% atmospheric humidity at 40°C for 48 hrs

Visual inspection

Check

- that all equipment is enclosed in the crate according to the packing list.
- the equipment for any apparent damage and document carefully if found.

If any equipment is missing or damaged are found, contact Cytiva immediately.

Safety instructions

The following precautions must be considered when unpacking the product.



CAUTION

Do not lift the system by holding tank support, pumps, pressure sensors, adjuster valves and any protruded objects. This can cause malfunction of the system.



CAUTION

Always lift the system by holding the base plate.



CAUTION

Two persons are required to lift ÄKTA flux s. Lift only in the bottom part of the system.



CAUTION

Make sure that the system is placed on a stable, level bench with adequate space for ventilation.

Refer to *Unpacking Instructions* (29056121), for a full description of the unpacking procedure.

5.3 Transport

Introduction

This section outlines important information that must be considered when transporting ÄKTA flux s.

Moving ÄKTA flux s



CAUTION

Before moving ÄKTA flux s the following must be done:

1. Empty ÄKTA flux s.
2. Shut down ÄKTA flux s and disconnect the power cord.

Transport requirements

Parameter	Allowed range
Ambient temperature, transport	-25°C to +60°C Temperature gradients of $\leq \pm 1^\circ\text{C}/\text{min}$ See detailed information in Operating limits, on page 202 .

Balance shipping protection



NOTICE

If the ÄKTA flux s is moved without a balance shipping protection in place, the tank must be empty and only small gentle movements are allowed. If the tank is to be transported or put into storage, a balance shipping protection must always be in place.

5.4 Set up the ÄKTA flux s

Introduction

This section describes installation procedures for the instrument.

In this section

Section	See page
5.4.1 Power supply	69
5.4.2 Install and remove the tank	71
5.4.3 Tubing	72
5.4.4 Install the transfer pump	83
5.4.5 Install the permeate pump	87
5.4.6 Install the permeate pressure sensor	91
5.4.7 Pump tubing	94
5.4.8 Set up the system computer	97
5.4.9 User management	99
5.4.10 Installation test	107

5.4.1 Power supply

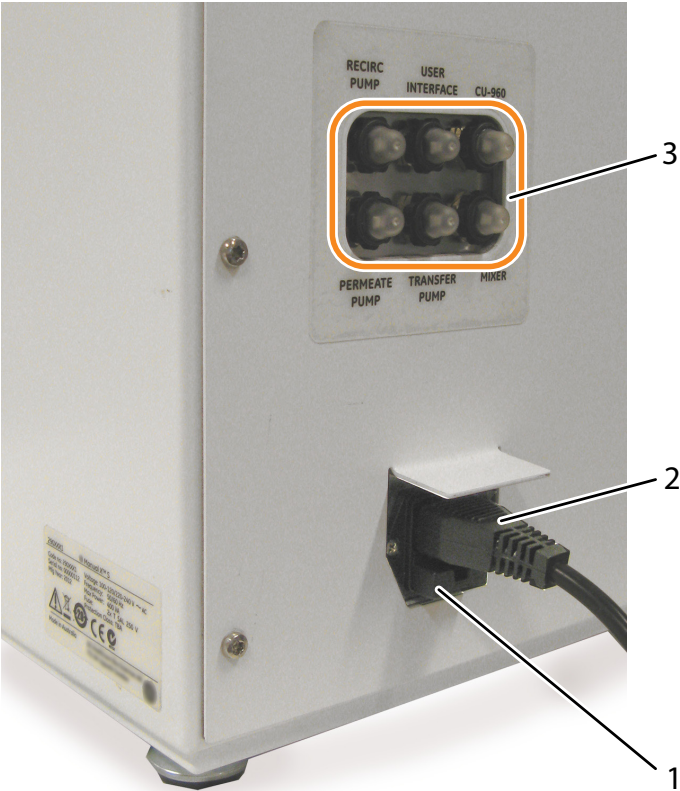
Power supply and fuses



WARNING

The supply voltage must correspond to the markings on the system.

The illustration below shows the location of the power supply and fuses on the ÄKTA flux s.



Part	Function
1	Fuse drawer with two mains fuses. For specification of the fuses, see Electric power, on page 202 .
2	Power connection

Part	Function
3	Automatic circuit breakers

Connect power supply



WARNING
ÄKTA flux s must always be connected to a grounded power outlet.



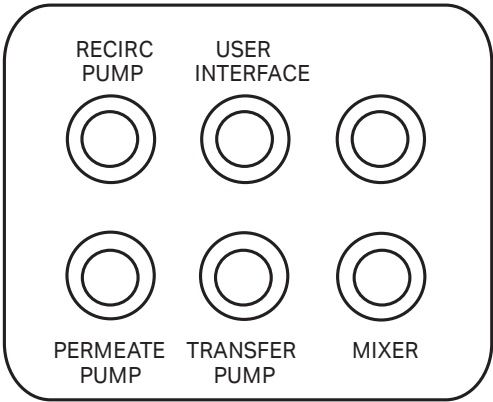
WARNING
Access to power switch and power cord. The power switch must always be easy to access. The power cord must always be easy to disconnect.

To connect the power supply, follow the instructions below.

Step	Action
1	Connect the power cord to the instrument.
2	Connect the power cord to a grounded power outlet specified in Section 5.1 Site requirements, on page 64 .

Built-in circuit breakers

All pumps, the operator touchscreen (the user interface), and the mixer are equipped with automatic circuit breakers, which are located at the rear side of ÄKTA flux s.



5.4.2 Install and remove the tank

Precautions



WARNING

Use fume mask during tank opening when processing hazardous liquids, to avoid possible exposure to aerosols.



CAUTION

Handle tank with care.

- Make sure the tank is not damaged or dropped during handling.
- Do not install or remove the tank in any other way than described in this manual.



NOTICE

Blocked vents can cause overpressure in tank.

Install the tank

Follow the instructions below to install the tank.

Step	Action
------	--------

- | | |
|---|-------------------------------------|
| 1 | Fit the tank to the tank holder. |
| 2 | Attach the inlet and outlet tubing. |

Remove the tank

Follow the instructions below to remove the tank.

Step	Action
------	--------

- | | |
|---|-------------------------------------|
| 1 | Empty the tank. |
| 2 | Remove the inlet and outlet tubing. |
| 3 | Remove the tank. |

5.4.3 Tubing

Introduction

ÄKTA flux s is delivered with necessary tubing for the recirculation loop. Other optional tubing is available from Cytiva.

Precautions



CAUTION

Changing of tubing exposes operator to residual fluid that might cause contamination of skin and clothing. Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.

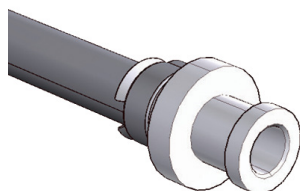


CAUTION

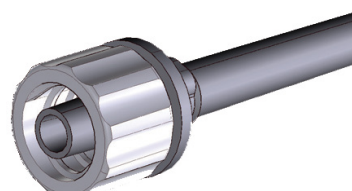
Use only tubing supplied by Cytiva.

Luer connections

All tubing is connected with Luer connections.



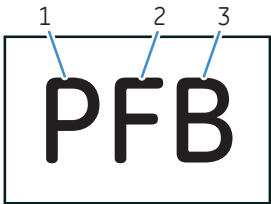
Female Luer



Male Luer

Pump tubing tags

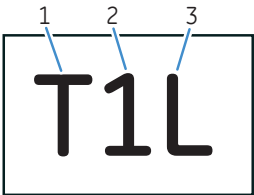
All pump tubing is tagged. The illustration below shows an example of a feed pump tubing tag. The characters on the tag are explained in the table.



Location	Tag	Description	Dimension
1	P	Pump tube	N/A
2	F	Feeding pump tube	N/A
3	A	Tubing size A	1.6 mm ID × 4.8 mm OD
	B	Tubing size B	3.2 mm ID × 6.3 mm OD
	D	Tubing size D	6.4 mm ID × 9.6 mm OD

Flow line tubing

All tubing for the flow lines is tagged. The illustration below shows an example of a tubing tag. The characters on the tag are explained in the table.



Location	Tag	Description
1	T	Transfer line
	F	Feed line
	R	Retentate line
	P	Permeate line
2	1, 2, 3...	Order in the line
3	L	Line tube

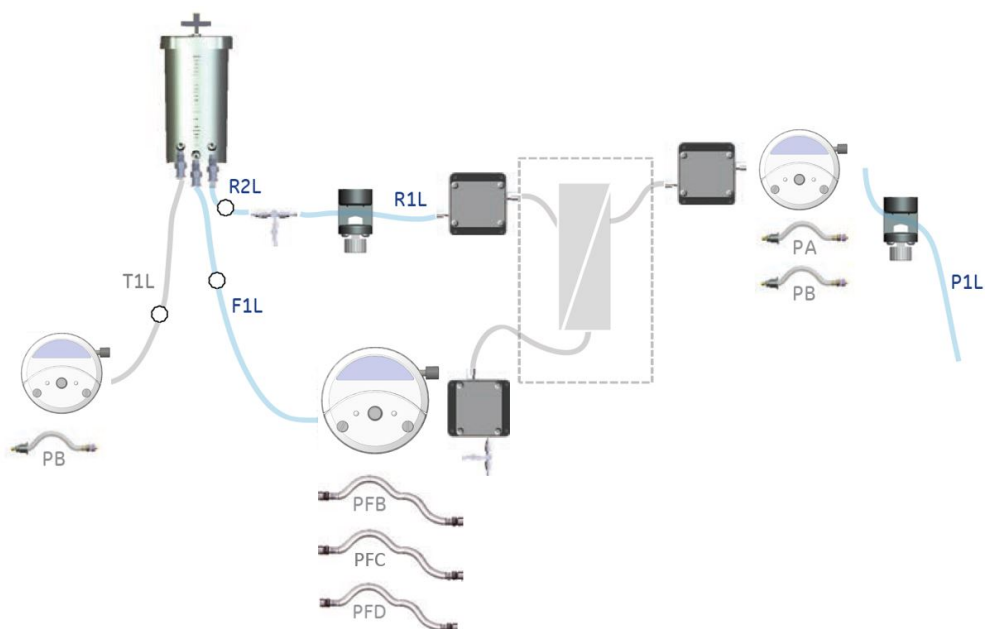
Pinch clamps

The tubing for the feed line, the retentate line and the transfer line are equipped with pinch clamps used for manual control of the flow.



Tubing connections

The illustration shows the tubing used in ÄKTA flux s.



Flow line tubing

The tubing listed below is delivered with ÄKTA flux s.

Tag	Tubing	Tubing size (ID=Inner diameter, OD=Outer diameter)
F1L	Tubing from tank outlet to feed pump	3.2 mm ID × 6.4 mm OD
R1L	Tubing from pressure sensor to drain valve	2.38 mm ID × 5.56 mm OD
R2L	Tubing from drain valve to tank inlet	2.38 mm ID × 5.56 mm OD

Pump tubing

The pump tubing listed below can be used with ÄKTA flux s.

Tag	Tubing size	Feed pump	Transfer pump	Permeate pump
PA	1.6 mm ID × 4.8 mm OD		X	X
PB	3.2 mm ID × 6.3 mm OD		X	X
PFB	3.2 mm ID × 6.3 mm OD	X		
PFC	4.8 mm ID × 8 mm OD	X		
PFD	6.4 mm ID × 9.6 mm OD	X		

Tubing for cleaning-in-place (CIP)

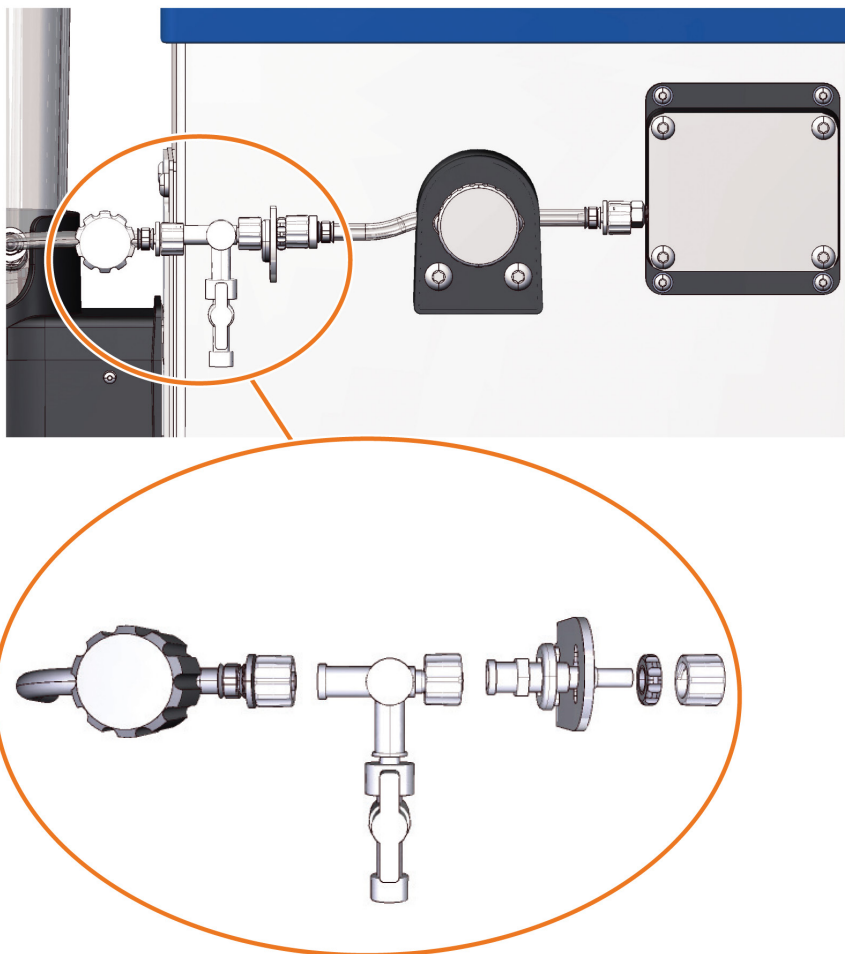
Tubing adapted for CIP is delivered with the instrument as standard.



Part	Tag	Description	Tubing size
1	MM11	Tubing to permeate pressure sensor	1.6 mm ID × 4.8 mm OD
2	MM12	Tubing to retentate pressure sensor	2.38 mm ID × 5.56 mm OD
3	MM32	Tubing to feed pressure sensor	2.38 mm ID × 5.56 mm OD

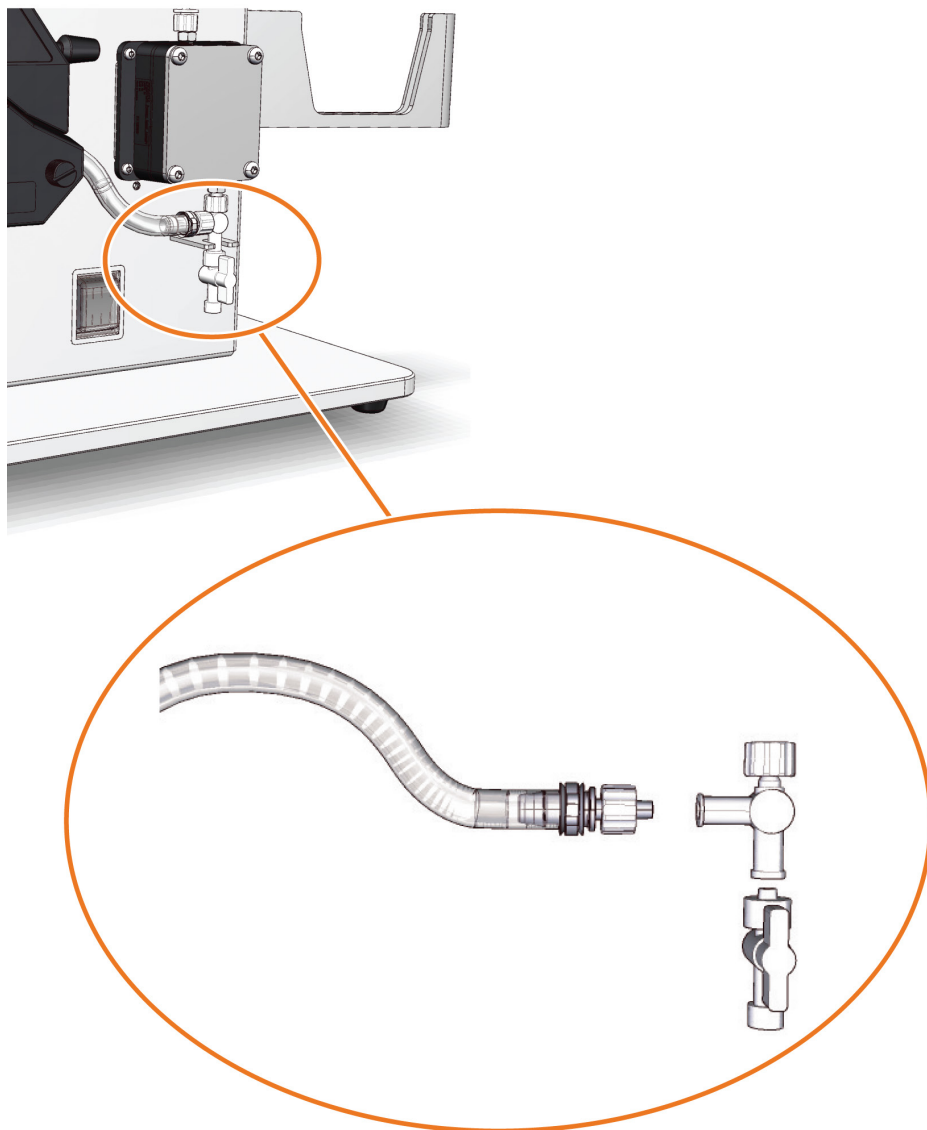
Upper drain valve

Use the exploded view as a help to put together the upper drain valve.



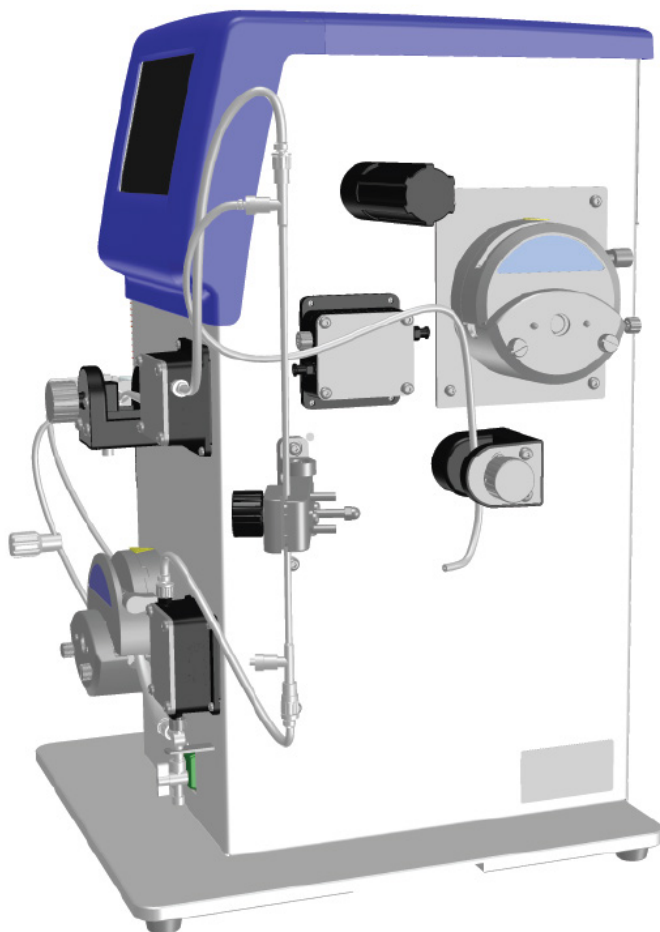
Lower drain valve

Use the exploded view as a help to put together the lower drain valve.



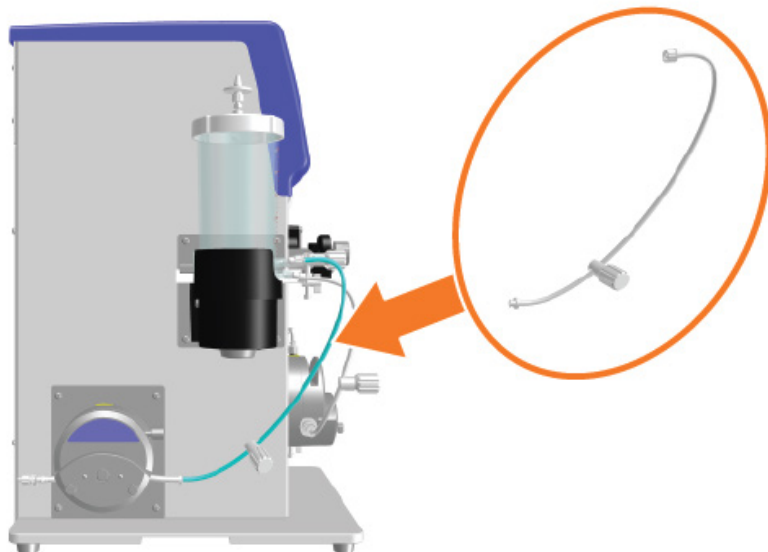
Permeate line tubing

The **P1L** tubing is used on the permeate side after the filter, when the optional permeate pressure pump is not installed.



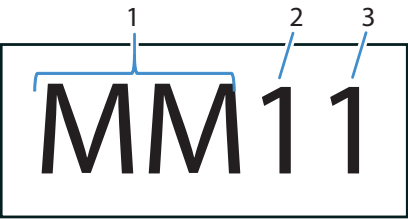
Transfer pump tubing

The **T1L** tubing is used when the optional transfer pump is installed. It is connected to the tank and to the pump tubing in the transfer pump.



Filtration tubing

All filtration tubing is tagged and delivered with the instrument. The illustration below shows an example of the filter tubing tags. The characters in the tag are explained in the table.



Location	Tag	Description	Dimensions/Length
1	MM	Male Male Luer type	
	MF	Male Female Luer type	
	FF	Female Female Luer type	
2	1	Tube length 1	115 mm tube length
	2	Tube length 2	165 mm tube length
	3	Tube length 3	230 mm tube length
	4	Tube length 4	400 mm tube length
	5	Tube length 5	600 mm tube length
3	1	Size 1	1.6 mm ID × 4.8 mm OD
	2	Size 2	3.2 mm ID × 6.4 mm OD

More information regarding the specific tubing needed for the filters can be found in [Section 6.1 Filter installation, on page 109](#).

5.4.4 Install the transfer pump

Introduction

This section describes how to install the optional transfer pump.

Precautions



WARNING

Disconnect power to the product before installation of the optional pump.



CAUTION

Take care not to drop the optional pump assembly during installation as it can result in damage to the unit or injury to yourself.

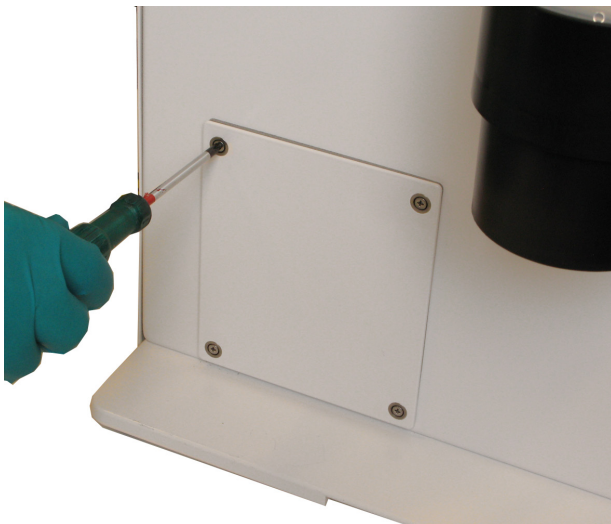
Tools required

A flat screwdriver is needed for the installation.

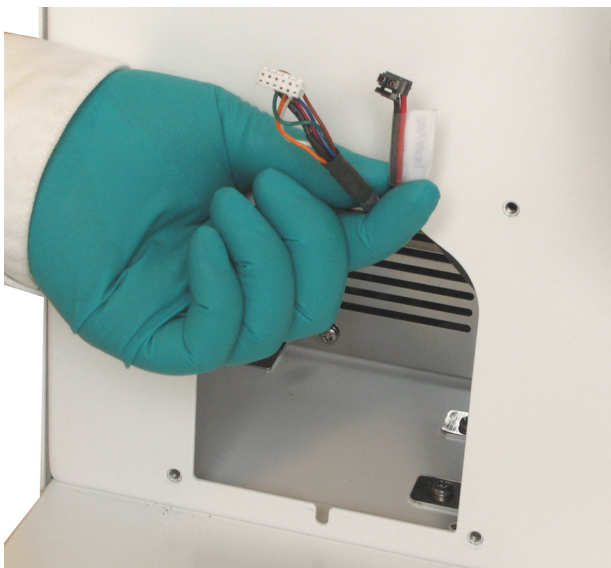
Install the transfer pump

Follow the instructions below to install the transfer pump.

Step	Action
1	Disconnect the power.
2	Unscrew the screws holding the casing for the transfer pump connections. Remove the casing.

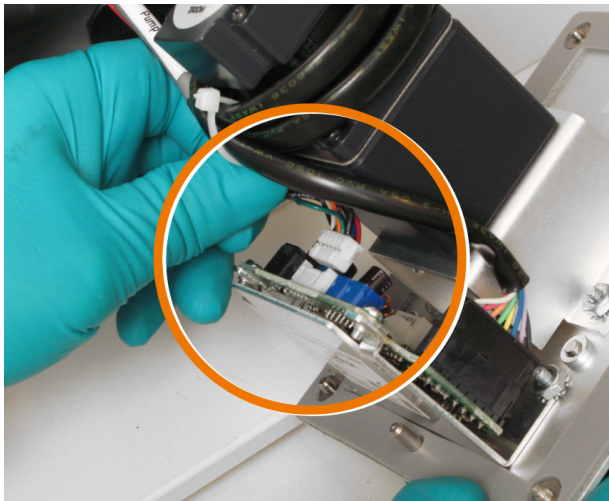


3	Pull out the power and communication cables.
---	--

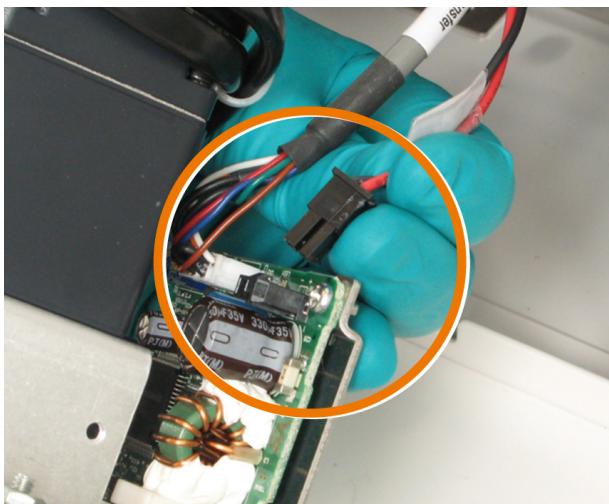


Step	Action
------	--------

- | | |
|---|---|
| 4 | Connect the communication cable to the corresponding connection on the transfer pump. |
|---|---|

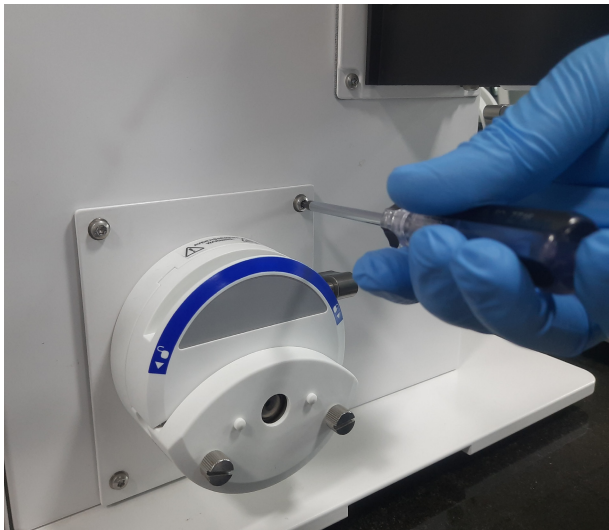


- | | |
|---|---|
| 5 | Connect the power cable to the corresponding connection on the transfer pump. |
|---|---|



Step	Action
------	--------

- | | |
|---|---|
| 6 | Attach the pump to ÄKTA flux s and make sure that the fittings for the screws on the chassis match the ones on the transfer pump. |
|---|---|



- | | |
|---|--|
| 7 | Fasten the screws. |
| 8 | When the transfer pump is installed, perform the following actions: <ul style="list-style-type: none">• Perform a motor control, see Section 6.4.5 Motor control, on page 136.• Install the pump tubing, see Install the pump tubing, on page 94.• Perform a calibration of the transfer pump, see Section 6.4.2 Calibration of the transfer pump, on page 125 (optional). |

5.4.5 Install the permeate pump

Introduction

This section describes how to install the optional permeate pump.

Precautions



WARNING

Disconnect power to the product before installation of the optional pump.



CAUTION

Take care not to drop the optional pump assembly during installation as it can result in damage to the unit or injury to yourself.

Tools required

A flat screwdriver is needed for the installation of the permeate pump.

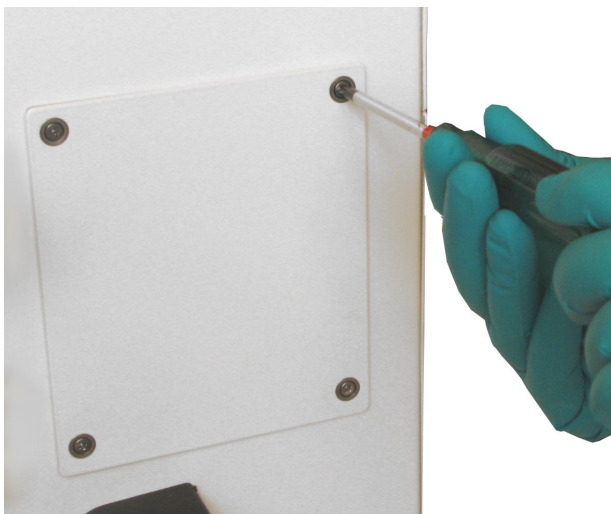
Install the permeate pump

Follow the instructions below to install the permeate pump.

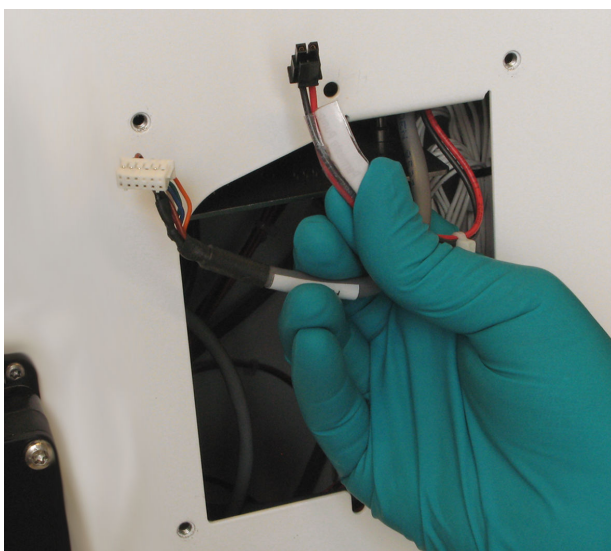
Step	Action
------	--------

1	Disconnect the power.
---	-----------------------

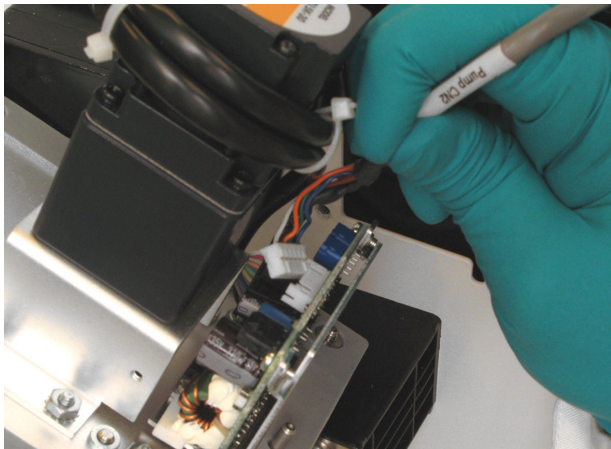
Step	Action
2	Unscrew the screws holding the casing for the permeate pump connections.



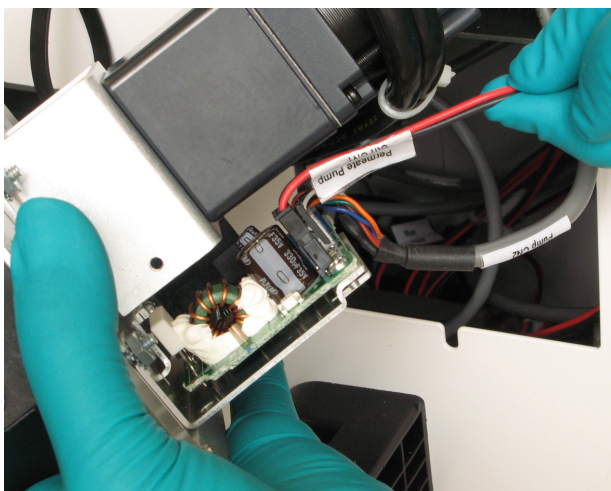
3	Pull out the power and communication cables.
---	--



Step	Action
4	Connect the communication cable to the corresponding connection on the permeate pump.

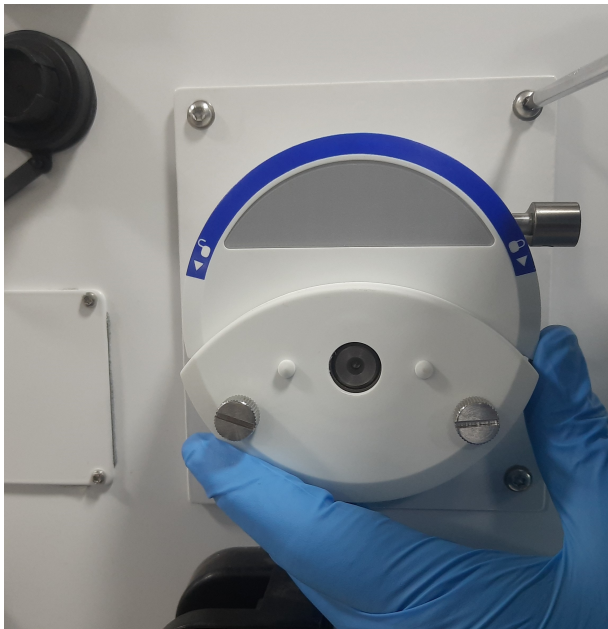


5	Connect the power cable to the corresponding connection on the permeate pump.
---	---



Step	Action
------	--------

- | | |
|---|---|
| 6 | Attach the pump to ÄKTA flux s and make sure that the fittings for the screws on the chassis match the ones on the permeate pump. |
|---|---|



- | | |
|---|---|
| 7 | Fasten the screws. |
| 8 | When the permeate pump is installed, perform the following actions: <ul style="list-style-type: none">• Perform a motor control, see Section 6.4.5 Motor control, on page 136.• Install the pump tubing, see Install the pump tubing, on page 94.• Perform a calibration of the permeate pump, see Section 6.4.3 Calibration of the permeate pump, on page 130 (optional action). |

5.4.6 Install the permeate pressure sensor

Introduction

This section describes how to install the optional permeate pressure sensor.

Precautions



WARNING

Disconnect power to ÄKTA flux s before installation of the permeate pressure sensor.

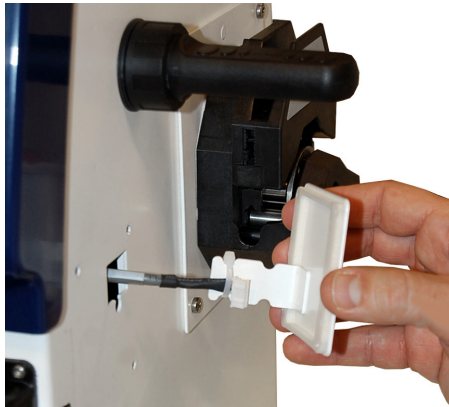
Tools required

A T20 Torx screwdriver is needed for the installation of the permeate pressure sensor.

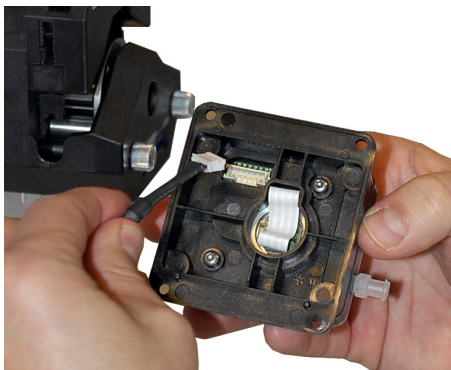
Install the permeate pressure sensor

Follow the instructions below to install the permeate pressure sensor.

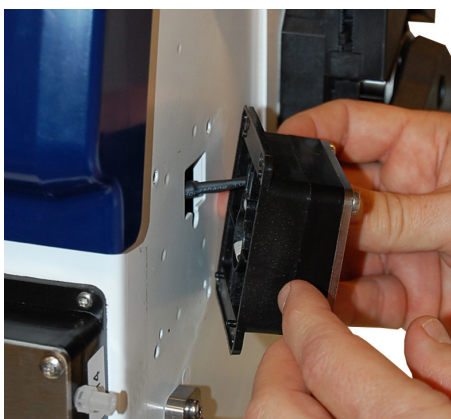
Step	Action
1	Disconnect the power.
2	Remove the screws holding the casing for the pressure sensor connections. Disconnect the power and communication cable from the casing.



Step	Action
3	Connect the power and communication cable to the connection on the pressure sensor.



4	Place the pressure sensor over the fittings for the screws on the chassis so that they match.
---	---



Step	Action
------	--------

5	Fasten the screws.
---	--------------------



6	Calibrate the pressure sensor using the supplied factory settings.
---	--

5.4.7 Pump tubing

Install the pump tubing



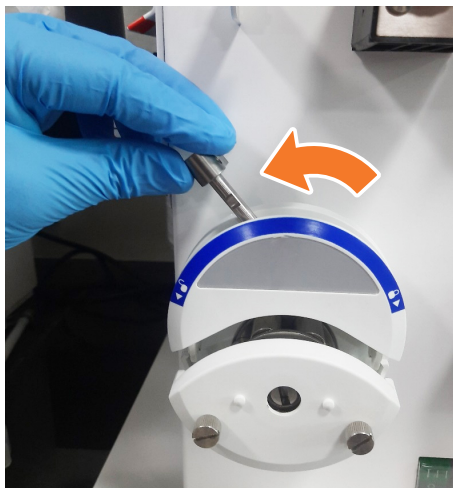
WARNING

Disconnect power to the product before installing the pump tubing.

Follow the steps below to install the pump tubing.

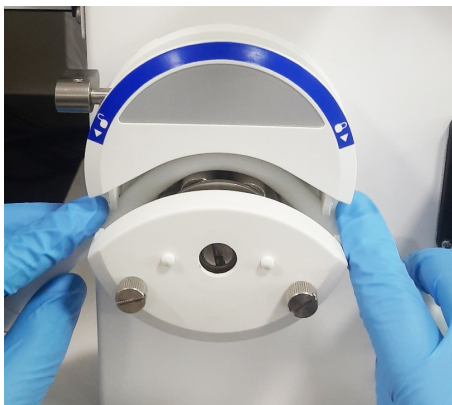
Step	Action
------	--------

- | | |
|---|---|
| 1 | Open the pump head by rotating the lever to the left. |
|---|---|



Step	Action
------	--------

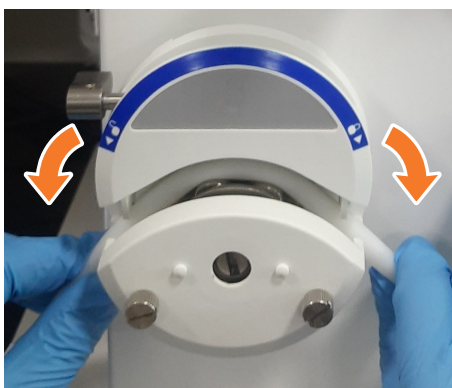
- | | |
|---|--|
| 2 | Route the pump tubing through the pump. Center the tubing between the retainers. |
|---|--|



NOTICE

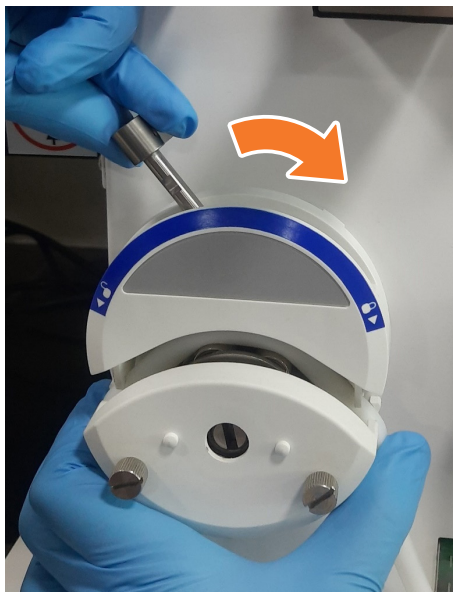
Make sure the tubing is straight where it enters and exits the pump. Twisting can cause damage to the tubing.

- | | |
|---|--|
| 3 | Lightly pull on the tubing downwards to pre-stretch. |
|---|--|



Step	Action
------	--------

- | | |
|---|---|
| 4 | Holding the tubing, rotate the lever to the right to close the pump head. |
|---|---|



- | | |
|---|---|
| 5 | Rotate the lever completely to close the pump head. |
|---|---|



NOTICE

Make sure the tubing is fitted between the retainers and check that the tubing is not twisted.

5.4.8 Set up the system computer

This section describes how to start and log on to the system computer.

Log in to the system computer

Follow the instructions below to log in and setup the system computer.

Step	Action
------	--------

1	Switch on the instrument.
---	---------------------------

Result:

The software launches automatically and you are redirected to the **End-user license agreement** screen.

Note:

Log in is disabled until the end user license agreement is accepted.

End-user licence agreement

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi sollicitudin, magna nec lacinia consectetur, arcu justo pellentesque ante, eu sodales ligula felis a lectus. Nam aliquam felis sed elit dictum elementum. Aliquam enim arcu, rhoncus ac neque et, bibendum commodo tellus. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Duis et imperdiet mauris. Integer commodo vestibulum dolor, vitae pretium nisi facilisis ut. Etiam consectetur blandit risus, posuere iaculis lectus malesuada sed. Vivamus sit amet eros ullamcorper, sagittis ipsum id, fermentum velit.

Nullam eget enim et arcu dictum aliquam. Fusce metus leo, malesuada et viverra ac, porttitor dignissim sapien. Cras rhoncus ornare volutpat. Pellentesque lobortis tristique velit, sit amet cursus nibh pharetra et. Ut id vestibulum justo. Orci varius natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Fusce ultricies condimentum euismod. Donec elementum sapien orci, vel facilisis nunc congue non. Sed metus metus, fringilla ut pretium pharetra, suscipit sed leo. Nullam sed erat quis libero tristique consectetur.

Donec ut massa sit amet metus pulvinar varius quis vel ipsum. Mauris molestie blandit elit, nec facilisis nibh sagittis sed. Ut quis augue quam. Nulla facilisi. Donec ac tempor mi, in aliquet purus. Nam at lorem nec dolor posuere suscipit. Ut fermentum lorem et arcu egestas posuere. Aliquam at accumsan risus. In vitae eleifend ipsum.

Aliquam vel auctor sapien, a finibus orci. Suspendisse ligula nibh, lacinia a ullamcorper at, tristique ac felis. Cras fringilla eros magna, sed lobortis enim tempus sed. In euismod nisi turpis, eget mollis orci ultricies non. Vivamus porta ipsum non pellentesque eleifend. Fusce aliquet ut est sit amet ultrices. Morbi malesuada pulvinar dolor non fermentum. Morbi nec convallis mauris. Vivamus fringilla turpis sit amet eleifend suscipit. Mauris ultrices, ipsum in aliquet iaculis, dui arcu porttitor erat, ut finibus augue orci ac velit. Suspendisse cursus mauris sed vulputate efficitur. Nullam gravida arcu ut facilisis cursus.

Duis semper nibh at diam eleifend, sollicitudin tincidunt risus porta. Donec in consequat leo, nec placerat tortor. Sed hendrerit vehicula vulputate. Suspendisse eget dignissim dolor. Nulla lacinia urna tellus, sit amet tincidunt nulla eleifend vel. Duis et consectetur orci. Aliquam fringilla egestas risus eu convallis. Suspendisse est sapien, fermentum vitae iaculis vitae, vestibulum

☒ Do not show on startup

Decline

Accept

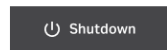
2	Tap Accept in the End-user license agreement screen.
---	--

Result:

Log in is now enabled.

Step	Action
------	--------

3	Tap Log in .
---	---------------------



4	Enter the Username and password provided by Cytiva. Then, tap Log in .
---	---



Username *

johannes.smithfield@cytiva.com

Cancel

Password *



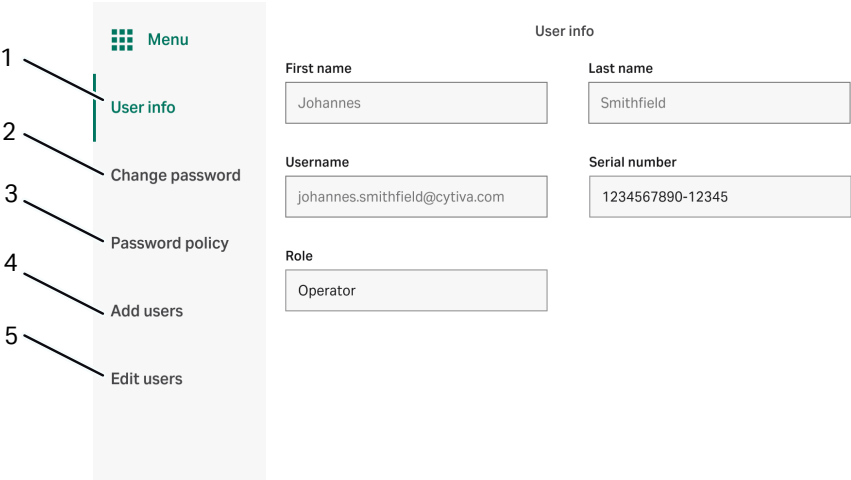
Log in

**Result:**

The user logs in and the main menu is displayed.

5.4.9 User management

The illustration below shows a **User management** screen.



Part	Function	Description
1	User info	Displays information about the active user account.
2	Change password	Change the password of the active user account.
3	Password policy	Displays password policies.
4	Add users	Create a new user profile. Note: <i>An Administrator can manage active and inactive user accounts here.</i>
5	Edit users	Edit information about the active user account.

Change password

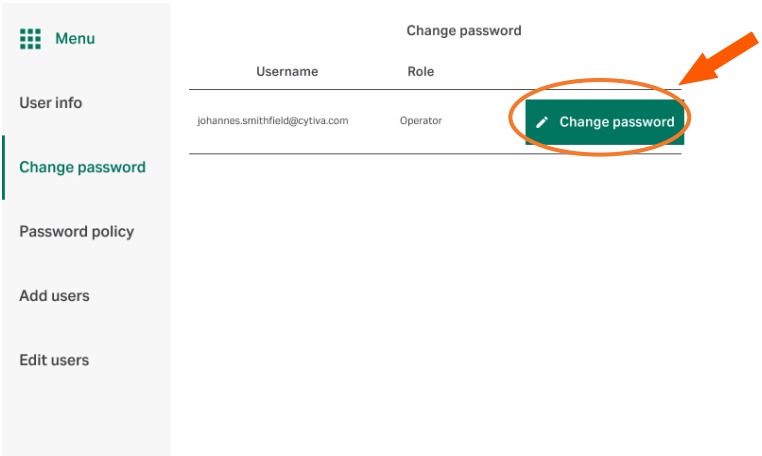
A user can change their password from the **Change password** tab. Follow the steps below to change user login password.

Note: An administrator can reset password for any user profile.

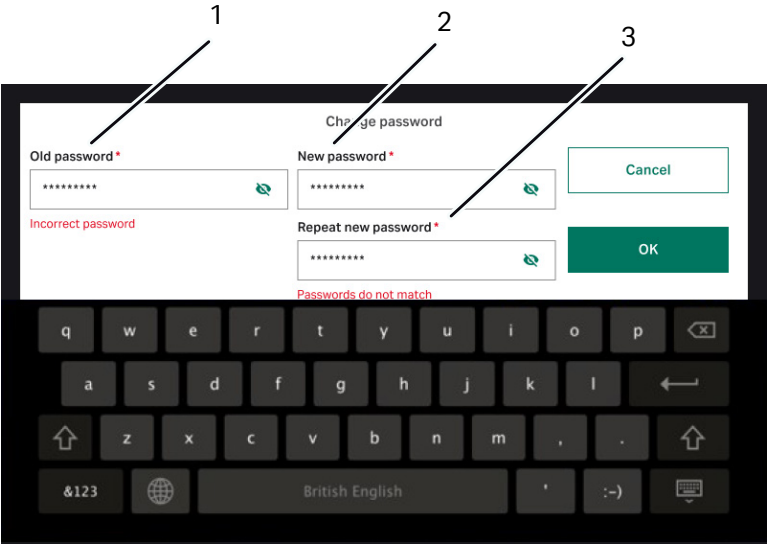
Step	Action
1	In the main menu, tap User management → Change password .

Step Action

2 Tap **Change password** that is shown next to the username.



3 Enter the old password (1), new password (2), and re-enter the new password (3).



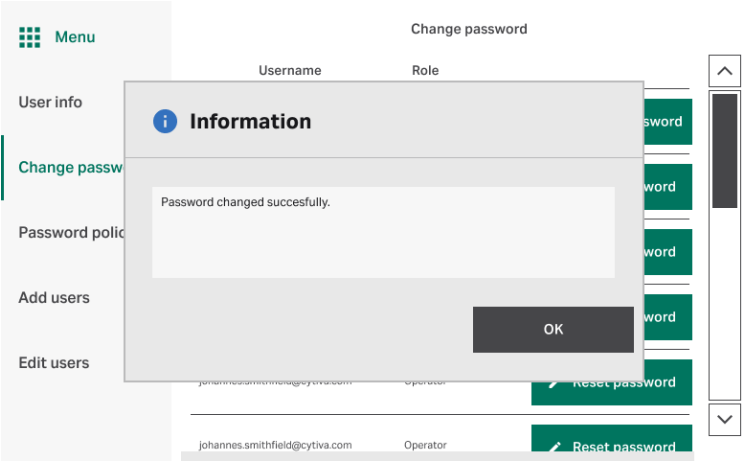
4 Tap **OK**.

Step

Action

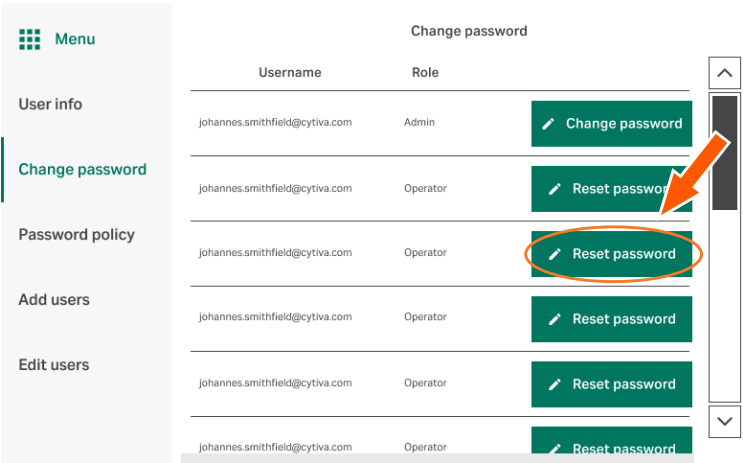
5

Tap **OK** in the confirmation pop-up window.



6

For an administrator, tap **Reset password** that is shown next to the user-name that you want to edit. Then follow the steps 3-5 above.



Result:
A temporary password is created. Note down the temporary password.

Note:
The temporary password must be changed upon first log in by the user.

Edit Password policy

The **Password policy** tab provides information about password requirements. An administrator can change password policies. Follow the steps below to change the password policies.

- | Step | Action |
|------|---|
| 1 | Log in with a user account that has the administrator authority level. |
| 2 | In the main menu, tap User management → Password policy . |
| 3 | Select the password parameters from the drop-down menus. |

The screenshot shows the 'Password policy' configuration interface. On the left is a vertical menu with options: Menu, User info, Change password, Password policy (which is highlighted with a green bar), Add users, and Edit users. The main content area is titled 'Password policy' and contains six configuration sections, each with a dropdown menu: 'Password expiry' (set to 'Never expires'), 'Enforce password history' (set to '3 passwords remembered'), 'Minimum length' (set to '8 characters'), 'Complexity' (set to 'Must mix alpha & numeric'), 'Max. invalid login attempts' (set to '10'), and 'Lockout effective period' (set to '15 minutes'). A green 'Submit' button is located at the bottom right of the configuration area.

- | | |
|---|--|
| 4 | Tap Submit .
<i>Result:</i>
Updated password policy is applied to the system. |
|---|--|

Add User

An administrator can create new user profile. Follow the steps below to create new user profile.

- | Step | Action |
|------|--|
| 1 | Log in with a user account that has the administrator authority level. |
| 2 | In the main menu, tap User management → Add users . |

Step	Action
3	Enter the required information, and tap Add .

The screenshot shows the 'Add users' form. On the left is a sidebar menu with options: Menu, User info, Change password, Password policy, Add users (highlighted), and Edit users. The main form area is titled 'Add users' and contains the following fields: 'First name *' with the value 'Johannes', 'Last name' with the value 'Smithfield', 'Username *' with the value 'johannes.smithfield@cytiva.com', and 'Role *' with a dropdown menu showing 'Operator' and 'Service'. There is a 'Reset' button below the role dropdown. To the right of the username field is a toggle switch for 'Active' status, currently set to 'Not active'. At the bottom right, a green '+ Add' button is circled in orange with an orange arrow pointing to it.

4	Note down the username and temporary password for the new user, and then tap OK .
---	--

The screenshot shows the 'Add users' form with an 'Information' dialog box overlay. The dialog box has a title bar with an information icon and the text 'Information'. The main content of the dialog box reads: 'User Johannes Smithfield has been created', 'Username: johannes.smithfield@cytiva.com', 'Temporary password: FDg85m>1!p', and 'NOTE: Password is one-time only and has been changed upon login!'. There is an 'OK' button at the bottom right of the dialog box. The background form is partially visible, showing the 'Add users' button and the 'Reset' button.

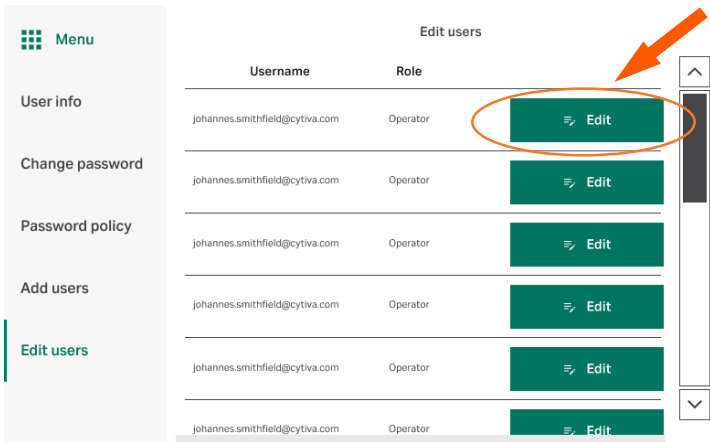
Note:
The temporary password must be changed upon first log in by the user.

Edit User

An administrator can edit and delete user profiles. Follow the steps below to edit or delete a user profile.

Step	Action
1	Log in with a user account that has the administrator authority level.

- | Step | Action |
|------|--|
| 2 | In the main menu, tap User management → Edit users . |
| 3 | Edit a user profile:
a. Tap Edit that is shown next to the username you want to edit. |

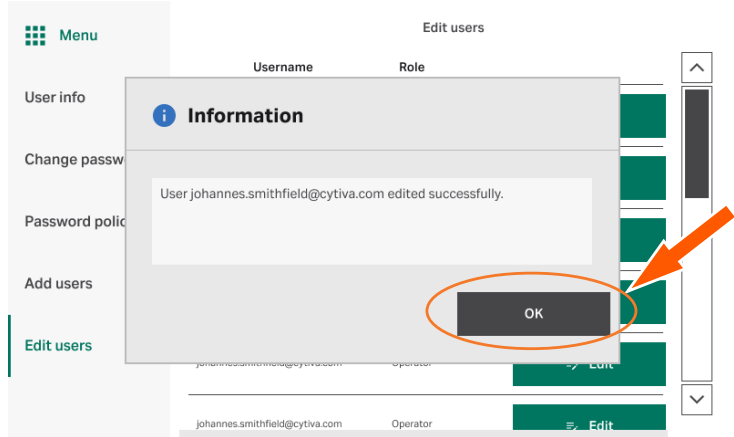


- b.** Make the required changes and then tap **OK**.

The screenshot shows the 'Edit user' form. It contains four input fields: 'First name *' with the value 'Johannes', 'Last name' with the value 'Smithfield', 'Username' with the value 'johannes.smithfield@cytiva.com', and 'Role *' with a dropdown menu showing 'Select an option'. At the bottom left is a dark grey button with a trash icon and the text 'Delete user'. At the bottom right is a green button with the text 'OK'. The 'OK' button is circled in orange, and an orange arrow points to it from the bottom right.

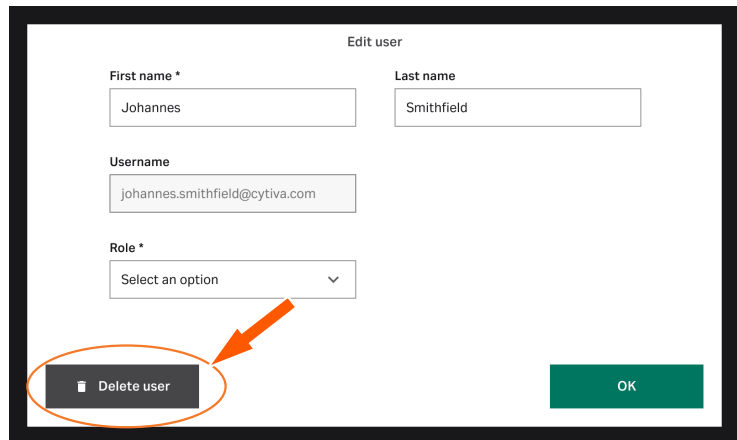
Step	Action
------	--------

- | | |
|--|--|
| | <p>c. Tap OK in the confirmation pop-up window.</p> |
|--|--|



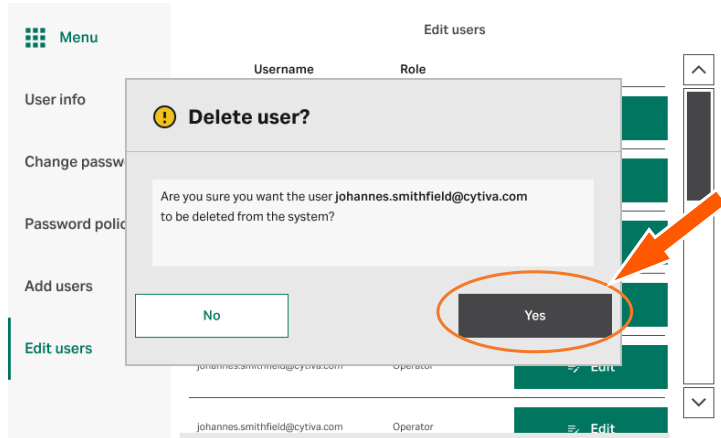
- | | |
|---|------------------------|
| 4 | Delete a user profile: |
|---|------------------------|

- | | |
|--|---|
| | <p>a. Tap Edit that is shown next to the username you want to delete (see image in step 3a).</p> <p>b. Tap Delete user.</p> |
|--|---|

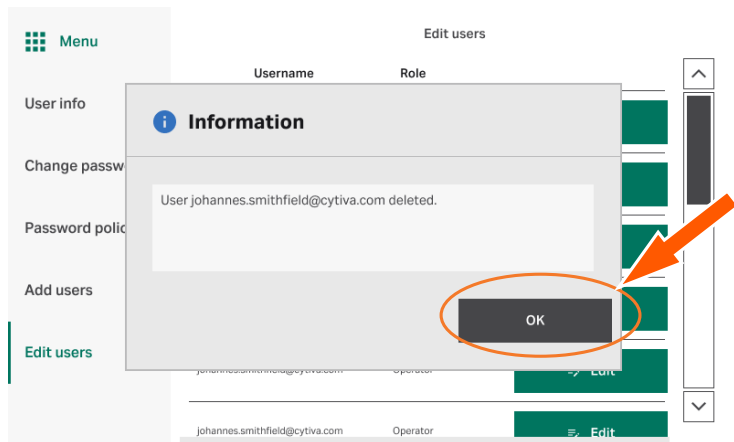


Step	Action
------	--------

- a. Tap **Yes** in the confirmation pop-up window.



- b. Tap **OK**.



Note:

You can not create a new user account with the same username as that of the deleted account.

5.4.10 Installation test

The following performance tests must be done after installation.

- Feed pump motor control, see [Section 6.4.5 Motor control, on page 136](#).
- Tank level calibration, see [Calibrate the tank level, on page 137](#).
- Feed pump calibration, see [Section 6.4.1 Calibration of the feed pump, on page 120](#).
- Check that the pressure sensors display zero bar when connected to atmospheric pressure.
- Check that all options are correct installed and functioning.

6 Prepare for a run

About this chapter

This chapter provides the information required to prepare ÄKTA flux s for operation.

Before ÄKTA flux s is taken into operation, make sure that all procedures in the following chapter and section have been performed:

- [Chapter 5 Installation, on page 63](#) and
- Actions before operation in [Section 9.2 User maintenance schedule, on page 183](#)

In this chapter

Section	See page
6.1 Filter installation	109
6.2 Install Centramate cassette and holder	116
6.3 Testing filters	118
6.4 Calibration	119

Precautions



WARNING

Before performing any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in [Chapter 2 Safety instructions, on page 11](#), as listed below:

- [General precautions, on page 13](#)
- [Personal protection, on page 13](#)
- [Operation, on page 18](#)

6.1 Filter installation

Introduction

This section contains general information on where and how to install the different types of filters on ÄKTA flux s.

Precautions



WARNING

Make sure that the filter is installed according to instructions for use of the filter.



WARNING

Before connecting the filter to ÄKTA flux s, 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 of the filter.

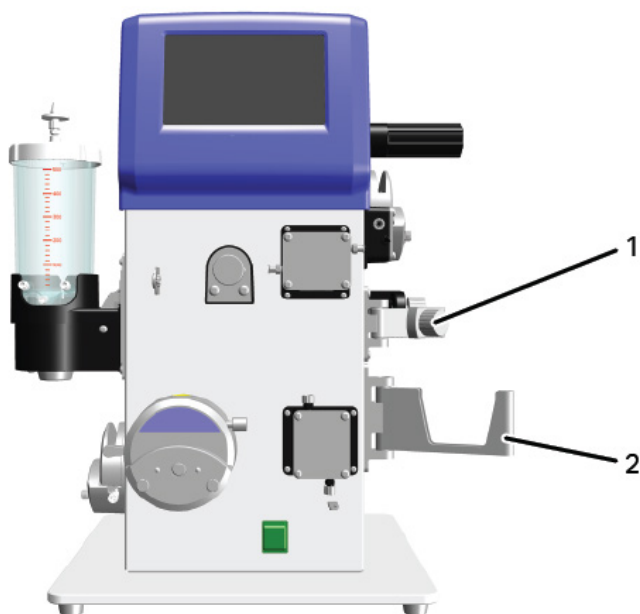
In this section

Section		See page
6.1.1	Filter holders and tubing	110
6.1.2	Install hollow fiber cartridges	112

6.1.1 Filter holders and tubing

Filter holders on ÄKTA flux s

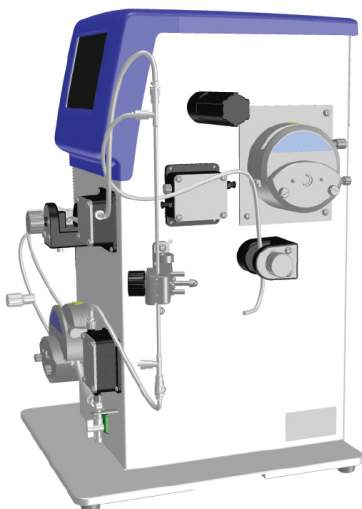
The image below shows where to attach different filter types on ÄKTA flux s.



Part	Function
1	Holder for HF cartridges
2	Holder for Centramate cassette (optional)

Using the P1L tubing

If the permeate control valve is used on the permeate side, the **P1L** tubing is connected to the permeate filter outlet.

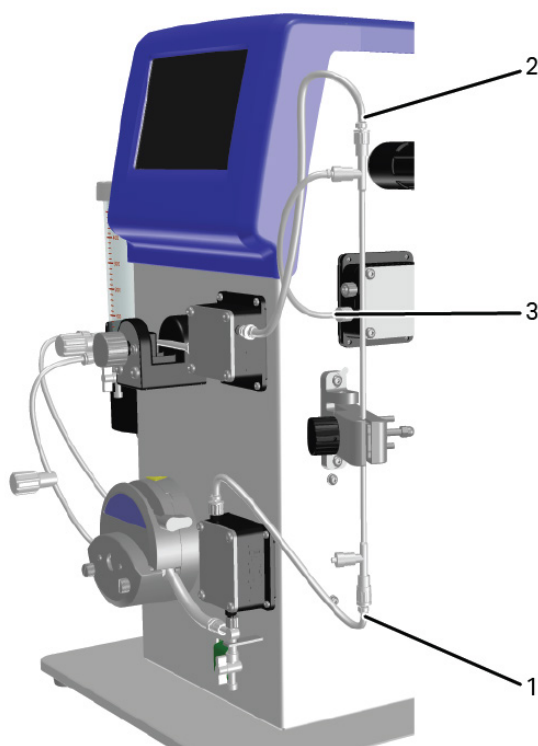


The descriptions on the following pages refer to installations with the optional permeate pressure sensor and the permeate pump installed. Each filter type used in these installations requires its own set of filter tubing.

6.1.2 Install hollow fiber cartridges

HF cartridges tubing

The filter tubing listed below can be used with HF (hollow fiber) cartridges and ÄKTA flux s.

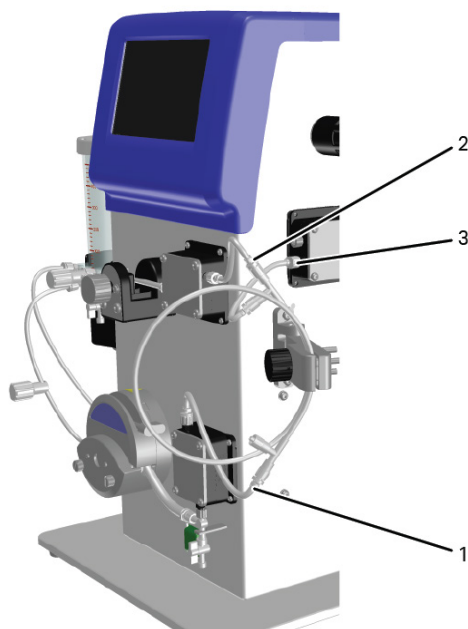


Part	Tubing	AXM		MidGee straight	
		Tag	Length	Tag	Length
1	From filter to feed pressure sensor	MM32	230 mm	MF32	230 mm
2	From filter to retentate pressure sensor	MM42	400 mm	MF42	400 mm
3	From filter to permeate pressure sensor ¹	MM41	400 mm	MF41	400 mm

¹ If the optional permeate pressure sensor and permeate pump are not installed the tubing **P1L** is to be attached on the filter permeate outlet.

HF hoop tubing

The filter tubing listed below can be used with HF hoop cartridges and ÄKTA flux s.



Part	Tubing	AXH		MidGee hoop	
		Tag	Length	Tag	Length
1	From filter to feed pressure sensor	MM32	230 mm	MF32	230 mm
2	From filter to retentate pressure sensor	MM22	165 mm	MF22	165 mm
3	From filter to permeate pressure sensor ¹	MM11	115 mm	MF11	115 mm

¹ If the optional permeate pressure sensor and permeate pump are not installed the tubing **P1L** is to be attached on the filter permeate outlet.

HF cartridges draining

Hollow fiber cartridges are provided with two connections to the permeate compartment, one in each end.

When mounted vertically, which is the case for ÄKTA flux s, the bottom connection serves as drain for the permeate. This allows a better recovery of the permeate.



Filter installation

Follow the instructions below to install an HF cartridge onto ÄKTA flux s.

Step	Action
1	Prepare and check the HF cartridge according to the manufacturer's instructions.
2	If the installed HF cartridge is new, it is strongly recommended to perform a filter integrity test to establish its characteristic air or nitrogen flow.
3	Attach the HF cartridge on the holder.
4	Connect the feed pressure sensor outlet to the feed inlet on the filter.
5	Connect the retentate outlet filter to the retentate pressure sensor inlet.

Step	Action
6	<p>Connect the filter permeate outlet to the tubing going into the permeate control valve or the permeate pressure sensor inlet on the system. Attach a stop plug to the lower permeate port.</p> <p>Tip: <i>Keep connected tubing short to minimize holdup volume.</i></p>
7	Continue preparation.

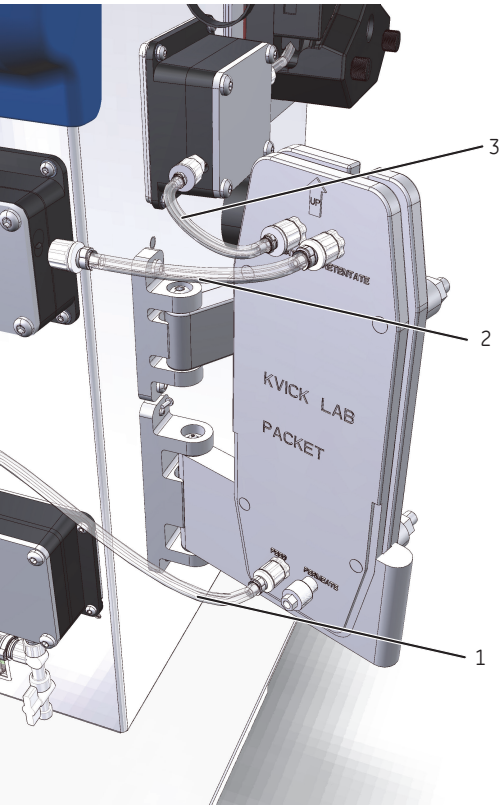
More information

- *Hollow fiber cartridges for membrane separations Operating handbook CY28744 , and*
- *Cross flow filtration Method Handbook CY14739.*

6.2 Install Centramate cassette and holder

Centramate cassette holder tubing

The filter tubing listed below can be used with Centramate cassette and holder and ÄKTA flux s.



Part	Description	Tag	Length
1	From filter to feed pressure sensor	MM32	230 mm
2	From filter to retentate pressure sensor	MM12	165 mm
3	From filter to permeate pressure sensor ¹	MM11	115 mm

¹ If the optional permeate pressure sensor and permeate pump are not installed the tubing **P1L** is to be attached on the filter permeate outlet.

Filter installation

Follow the instructions below to install a Kwick Lab packet holder with installed filters onto ÄKTA flux s.

Step	Action
1	Place the holder on the bench. Remove back plate.
2	<p>Insert a clean gasket onto the front plate. Alignment notches on the gasket will aid in positioning the gasket.</p> <ul style="list-style-type: none"> Notches on the end of the gasket align with the short posts on either end of the holder. Notches on one long side of the gasket align with threaded posts. Notches on the other long side are not relevant to the installation.
3	Place the packet onto the gasket, in the same orientation. If additional packets are used, stack them on top of the first one. Additional gaskets are not required.
4	Place the back plate on top of the last packet.
5	Place the spacers onto the bolts. If more than two Centramate cassettes are installed, do not use the spacers.
6	Add the washers and tighten the nuts by hand. Then, tighten each nut 1/4 of a turn, using an alternating pattern. Continue tightening 1/4 of a turn until the nuts are tight.
7	Connect the feed pressure sensor outlet to the feed inlet on the filter.
8	Connect the retentate outlet filter to the retentate pressure sensor inlet.
9	Connect the filter permeate outlet to the tubing going into the permeate control valve or the permeate pressure sensor inlet on the system. Attach stop plug to lower permeate port.

Tip:

Keep connected tubing short to minimize holdup volume.

More information

For more information see the *Data File* (18117157).

6.3 Testing filters

Introduction

Before using your ÄKTA flux s and cassette to process a product, the following pre-process procedures must be performed:

1. A filter integrity test
2. A leakage test
3. Clean Water Flux Test
4. Equilibrate flow path with a buffer flush

Filter integrity test

It is recommended to perform a filter integrity test on each filter before use. Perform the tests according to the filter manufacturer's instructions. This is usually some form of air diffusion test using a water wetted filter. Refer to *Cytiva integrity test guides 18117269*, or your filter manufacturer's instructions.

Leakage test

Follow the instructions below to perform a leakage test:

Step	Action
1	<p>Pressurize the system to the maximum intended process pressure:</p> <ol style="list-style-type: none"> a. Tap Feed on the main screen. b. Use the displayed keypad to set the desired feed pump speed and tap OK. For an instruction how to use set-points, see Adjust set-points, on page 177. c. Close the retentate valve.
2	<p>Check the system for leaks while maintaining the pressure. Pay special attention to the filter installation.</p>
3	<p>If leakage is discovered, there might be a cassette, gasket, or surface finish irregularity present. Proceed as follows:</p> <ol style="list-style-type: none"> a. Remove the filters and inspect the sealing surfaces. b. Correct any problems, reinstall the filters and execute the test again.

6.4 Calibration

Introduction

This section describes the procedures used to perform calibration of the pumps and other parts in ÄKTA flux s.

Note: *The images used in this section are for reference purpose only.*

When to use these procedures

It is recommended to perform calibrations before each run.

Allowed user performed calibrations:

- Pump flow rate for installed pumps
- Tank level
- Re-zero function of installed pressure sensors
- Motor RPM range calibration for installed motors (pumps and mixer)

Allowed service performed calibrations:

- All user allowed calibration
- Full range calibration of installed pressure sensors

The pressure and tubing dimension used when calibrating the system should always correspond to the pressure and tubing dimension used when performing a run.

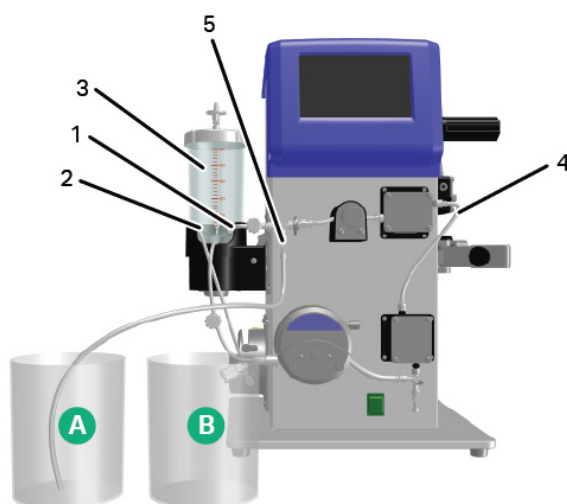
In this section

Section		See page
6.4.1	Calibration of the feed pump	120
6.4.2	Calibration of the transfer pump	125
6.4.3	Calibration of the permeate pump	130
6.4.4	Calibration of the pressure sensors	135
6.4.5	Motor control	136
6.4.6	Tank level	137

6.4.1 Calibration of the feed pump

Follow the instructions below to calibrate the system flow for the feed pump.

Step	Action
1	Block the retentate line to the tank by using the pinch clamp of the R2L tubing (1), and block the transfer line to the tank by adding a stopper (2) in the tank to transfer port.
2	Fill the tank with water (3).



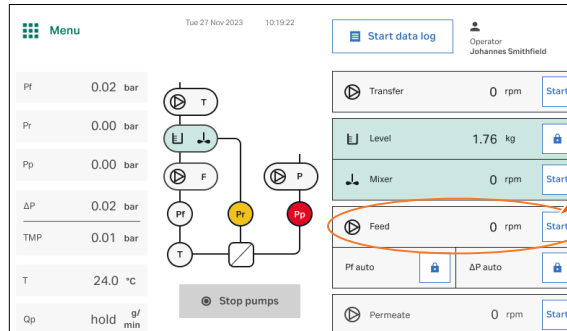
- 3 Replace the filter with tubing (4) between the feed pump pressure sensor and retentate pressure sensor.
- 4 Open the upper drain valve to collect the flow (5) in beaker A.
- 5 Set a low rpm value of the feed pump on the control panel and tap **Start**. Let the pump run for a couple of minutes. Fill more water in the tank, if needed. For an instruction how to use set-points, see [Adjust set-points, on page 177](#).

6 Prepare for a run

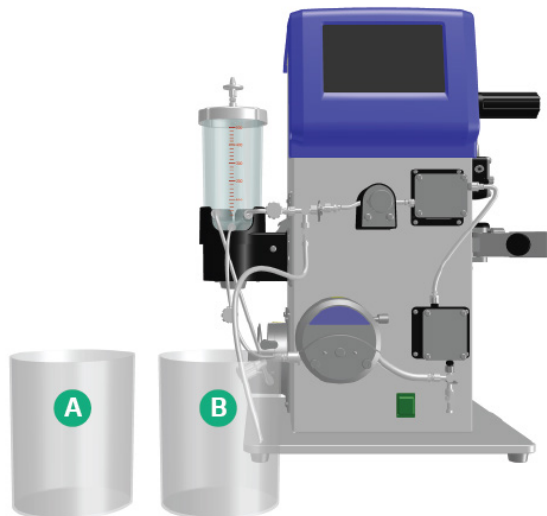
6.4 Calibration

6.4.1 Calibration of the feed pump

Step	Action
------	--------



- 6 Adjust the back pressure, if desired, by moving the retentate pressure control valve.
- 7 Note the **Pf** feed pressure sensor value on the indicator panel.
- 8 Remove the tubing from beaker A and put it in beaker B. Collect water between time point 0 and time point T, where T is at least one minute. Measure the mass of the water in beaker B with an external balance and calculate the flow rate (weight/time). Assuming that the density is 1, the measured value in kg/L will correspond to L/min.



Step	Action
------	--------

- | | |
|----|--|
| 9 | Perform the corresponding procedure (step 5 to 8) at a high rpm value for the feed pump. |
| 10 | Tap Settings on the main screen. |
| 11 | Tap Calibration . |
| 12 | Tap Feed pump on the Calibration screen. |

Calibration settings

Menu	Feed pump	Transfer pump	Permeate pump	Motor control
USB device	Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 18 ml/min	1.00 bar
2. 300 rpm, 191 ml/min	

Current:

0 rpm, 0.0 ml/min

1 30 rpm 18 ml/min

2 300 rpm 191 ml/min

Pressure 1.00 bar

← Enter

- | | |
|----|---|
| 13 | Enter the low rpm value of the feed pump and the corresponding calculated flow value in the gray field indicated with ①. Assuming that the density is 1, the measured value in kg/L will correspond to L/min. |
|----|---|

Calibration settings

Menu	Feed pump	Transfer pump	Permeate pump	Motor control
USB device	Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

RPM

Last calibration:

Current:

① 0 rpm 0.0 ml/min

② 0 rpm 0.0 ml/min

Pressure 0.0 bar

← Enter

Step	Action
------	--------

- | | |
|----|---|
| 14 | Enter the high rpm value of the feed pump and the corresponding calculated flow value in the gray field indicated with ②. |
|----|---|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 18 ml/min	1.00 bar
2. 300 rpm, 191 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

- | | |
|----|---|
| 15 | Enter the saved Pf feed pressure sensor value measured in the gray field marked with Pressure . |
|----|---|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 18 ml/min	1.00 bar
2. 300 rpm, 191 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

Step	Action
------	--------

16	Tap Enter .
----	--------------------

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 18 ml/min	1.00 bar
2. 300 rpm, 191 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure: 1.00 bar

← Enter

Result:

The software calculates the correlation between the selected RPM and the achieved flow, and calibrates the feed pump.

17	To see the flow in mL/min on the main screen after calibration, set the flow rate for the feed pump to mL/min, see Set units, on page 170 .
----	---

Note:

When the pump tubing is changed the pump calibration needs to be repeated.

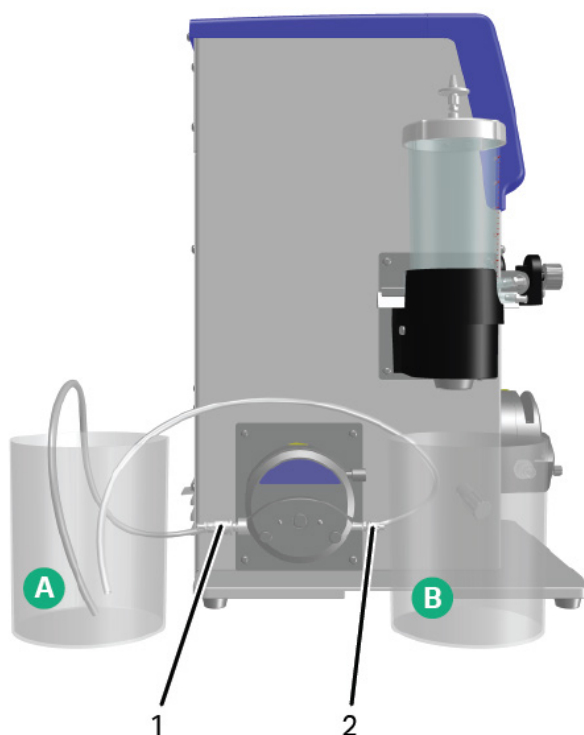
6.4.2 Calibration of the transfer pump

Normally the transfer pump is calibrated at a back pressure of 0 bar. If the transfer pump is to be calibrated at another back pressure, an external pressure sensor must be used together with a pinch to apply the back pressure.

Follow the instructions below to calibrate the system flow for the transfer pump at 0 bar back pressure. The transfer pump is optional.

Step	Action
------	--------

- | | |
|---|---|
| 1 | Connect tubing to the transfer pump inlet (1) and the transfer pump outlet (2). |
|---|---|



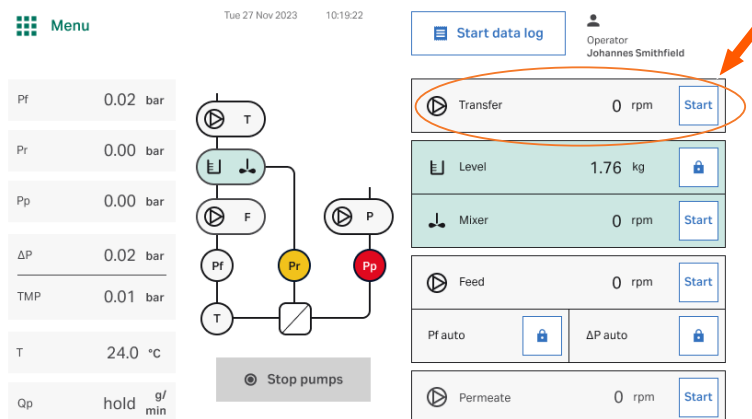
- | | |
|---|--|
| 2 | Fill beaker A with process liquid and put the tubing in the beaker. |
| 3 | Set a low RPM value of the transfer pump on the control panel and tap Start . Let the pump run for a couple of minutes.
For an instruction how to use set-points, see Adjust set-points, on page 177 . |

6 Prepare for a run

6.4 Calibration

6.4.2 Calibration of the transfer pump

Step Action



Menu

Tue 27 Nov 2023 10:19:22

Start data log

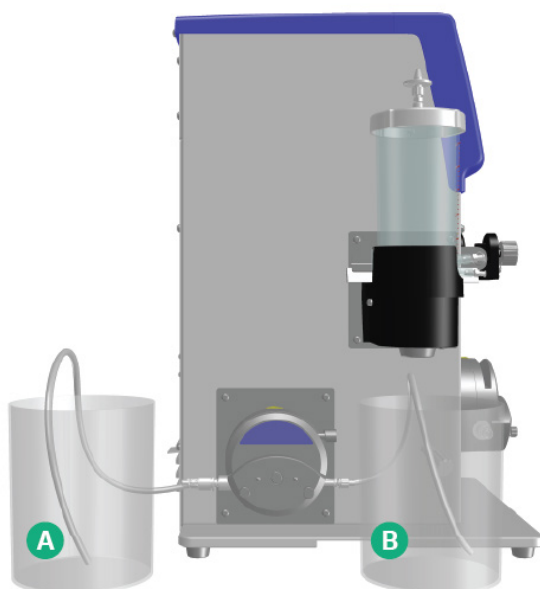
Operator: Johannes Smithfield

Pf	0.02 bar
Pr	0.00 bar
Pp	0.00 bar
ΔP	0.02 bar
TMP	0.01 bar
T	24.0 °C
Qp	hold g/min

Stop pumps

Transfer	0 rpm	Start
Level	1.76 kg	Start
Mixer	0 rpm	Start
Feed	0 rpm	Start
Pf auto	<input type="checkbox"/>	ΔP auto <input type="checkbox"/>
Permeate	0 rpm	Start

- 4 Move the tubing connected to the transfer pump outlet, from beaker A to beaker B (empty beaker), and start to collect flow at the transfer pump outlet.



- 5 Collect fluid between time point 0 and time point T. Measure the mass of the fluid in beaker B with an external balance and calculate the flow rate (weight/time).

Step	Action
------	--------

- | | |
|---|---|
| 6 | Perform the corresponding procedure (step 2 to 5) at a high RPM value of the transfer pump. |
| 7 | Tap Settings on the main screen. |
| 8 | Tap Calibration . |
| 9 | Tap Transfer pump on the Calibration screen. |

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration: Tue 27 Nov 2023

1. 30 rpm, 5.7 ml/min	1.00 bar
2. 300 rpm, 59.1 ml/min	

Current:

0 rpm, 0.0 ml/min

1 30 rpm 5.7 ml/min

2 300 rpm 59.1 ml/min

Pressure 1.00 bar

← Enter

- 10 Enter the low RPM value of the transfer pump and the corresponding calculated flow value in the gray field indicated with ①. Assuming that the density is 1, the measured value in g/min will correspond to mL/min.

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration: Tue 27 Nov 2023

1. 30 rpm, 5.7 ml/min	1.00 bar
2. 300 rpm, 59.1 ml/min	

Current:

0 rpm, 0.0 ml/min

1 30 rpm 5.7 ml/min

2 300 rpm 59.1 ml/min

Pressure 1.00 bar

← Enter

Step	Action
------	--------

- | | |
|----|--|
| 11 | Enter the high RPM value of the transfer pump and the corresponding calculated flow value in the gray field indicated with 2 . |
|----|--|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration: Tue 27 Nov 2023

1. 30 rpm, 5.7 ml/min	1.00 bar
2. 300 rpm, 59.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

- | | |
|----|---|
| 12 | The transfer pump is calibrated at 0 bar back pressure. |
|----|---|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration: Tue 27 Nov 2023

1. 30 rpm, 5.7 ml/min	1.00 bar
2. 300 rpm, 59.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

Step	Action
------	--------

13	Tap Enter .
----	--------------------

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration: Tue 27 Nov 2023

1. 30 rpm, 5.7 ml/min	1.00 bar
2. 300 rpm, 59.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure: 1.00 bar

← Enter

Result:

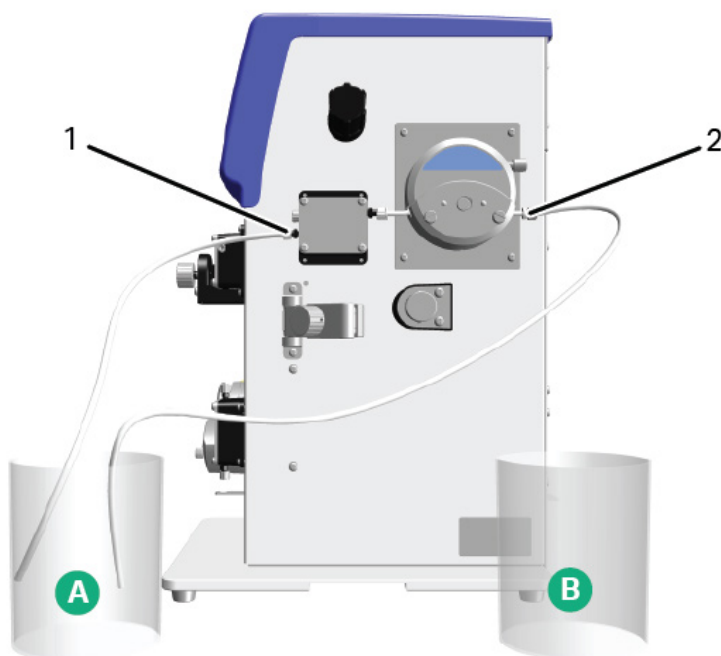
The software calculates the correlation between the selected RPM and the achieved flow, and calibrates the transfer pump.

14	To see the flow in mL/min on the main screen after calibration, set the flow rate for the transfer pump to mL/min, see Set units, on page 170 .
----	---

6.4.3 Calibration of the permeate pump

Follow the instructions below to calibrate the system flow for the permeate pump. The permeate pump is optional.

Step	Action
1	Connect tubing to the permeate pressure sensor inlet (1) and the permeate pump outlet (2).



- 2 Fill beaker A with process liquid and put the tubing in the beaker.
- 3 Set a low RPM value of the permeate pump on the control panel and tap **Start**. Let the pump run for a couple of minutes.
For an instruction how to use set-points, see [Adjust set-points, on page 177](#).

6 Prepare for a run

6.4 Calibration

6.4.3 Calibration of the permeate pump

Step Action

Menu

Tue 27 Nov 2023 10:19:22

Constant retentate volume: 302 g
Constant feed pressure: 0.02 bar

Start data log

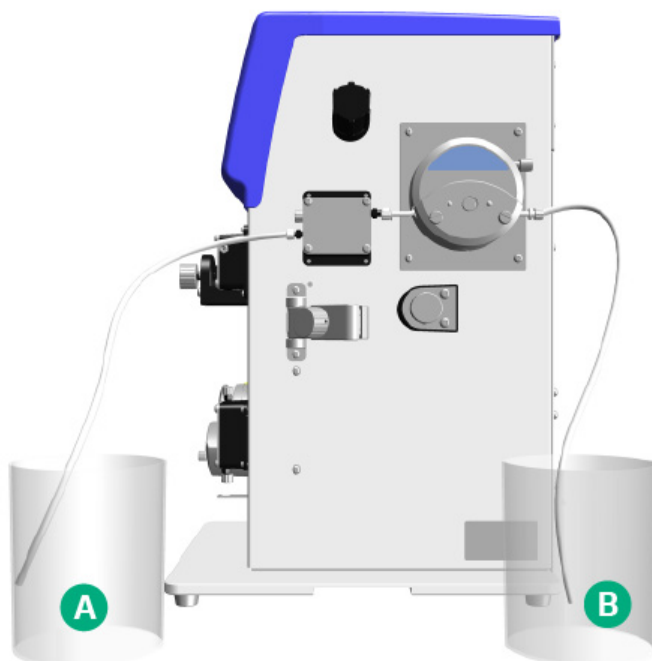
Operator
Johannes Smithfield

Pf	3.50 bar
Pr	3.50 bar
Pp	3.50 bar
ΔP	3.50 bar
TMP	3.50 bar
T	0.0 °C
Qp	hold g/min

Transfer	0 rpm	Start
Level	302 g	Lock
Mixer	0 rpm	Start
Feed	0 rpm	Stop
Pf auto	Lock	ΔP auto
Permeate	0 rpm	Start

→

- 4 Move the tubing connected to the permeate pump outlet, from beaker A to beaker B (empty beaker), and start to collect flow at the permeate pump outlet in beaker B.



- | Step | Action |
|------|---|
| 5 | Note the Pp permeate pressure sensor value shown on the indicator panel.
Collect fluid between time point 0 and time point T. Measure the mass of the fluid in beaker B with an external balance and calculate the flow rate (weight/time). |
| 6 | Perform the corresponding procedure (step 2 to 6) at a high RPM value of the permeate pump. |
| 7 | Tap Settings on the main screen. |
| 8 | Tap Calibration . |
| 9 | Tap Permeate pump on the Calibration screen. |

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 6.4 ml/min	1.00 bar
2. 300 rpm, 47.1 ml/min	

Current:

0 rpm, 0.0 ml/min

1 30 rpm 6.4 ml/min

2 300 rpm 47.1 ml/min

Pressure 1.00 bar

← Enter

Step	Action
------	--------

- | | |
|----|---|
| 10 | Enter the low RPM value of the permeate pump and the corresponding calculated flow value in the gray field indicated with ❶. Assuming that the density is 1, the measured value in g/min will correspond to mL/min. |
|----|---|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 6.4 ml/min	1.00 bar
2. 300 rpm, 47.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

- | | |
|----|---|
| 11 | Enter the high RPM value of the permeate pump and the corresponding calculated flow value in the gray field indicated with ❷. |
|----|---|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 6.4 ml/min	1.00 bar
2. 300 rpm, 47.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure

1.00 bar

← Enter

Step	Action
------	--------

- | | |
|----|--|
| 12 | Enter the saved Pp permeate pressure sensor value in the gray field marked with Pressure . |
|----|--|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 6.4 ml/min	1.00 bar
2. 300 rpm, 47.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure: 1.00 bar

← Enter

- | | |
|----|--------------------|
| 13 | Tap Enter . |
|----|--------------------|

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

ml/min

rpm

Last calibration:

1. 30 rpm, 6.4 ml/min	1.00 bar
2. 300 rpm, 47.1 ml/min	

Current:

0 rpm, 0.0 ml/min

Pressure: 1.00 bar

← Enter

Result:

The software calculates the correlation between the selected RPM and the achieved flow, and calibrates the permeate pump.

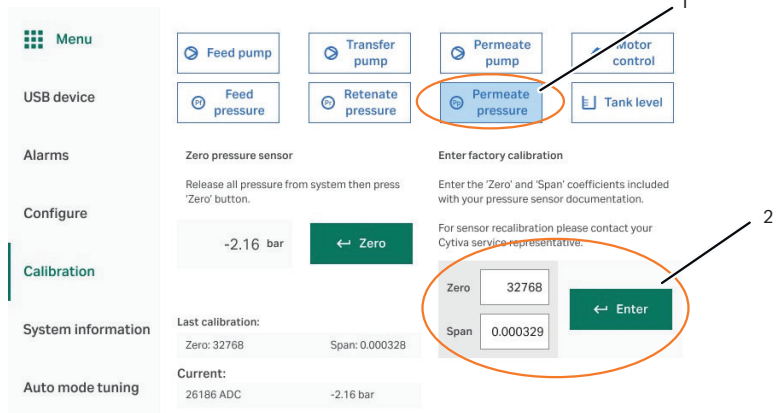
- | | |
|----|---|
| 14 | To see the flow in mL/min on the main screen after calibration, set the flow rate for the permeate pump to mL/min, see Set units, on page 170 . |
|----|---|

6.4.4 Calibration of the pressure sensors

Calibrate the permeate pressure sensor

Follow the instructions below to calibrate the permeate pressure sensor. The permeate pressure sensor is optional.

Step	Action
1	Tap Settings on the main screen.
2	Tap Calibration .
3	Tap Permeate pressure (1).



- 4 Enter the factory settings for the pressure unit connected to the system, in the gray fields (2) marked **Zero** and **Span**.

For an instruction how to use set-points, see [Adjust set-points, on page 177](#)

- 5 Tap **Enter**.

Result:

The factory settings for the permeate pressure of the installed unit are applied to the system.

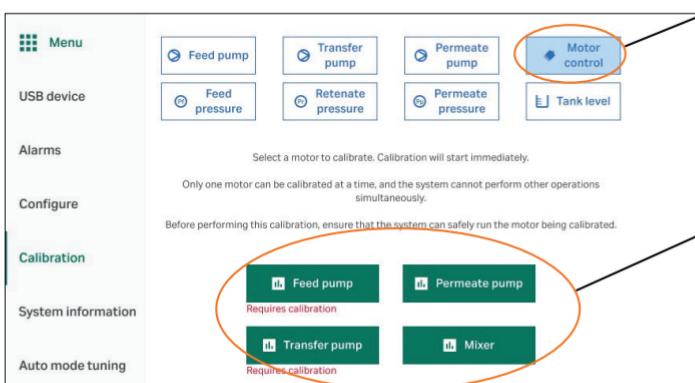
Calibrate pressure sensors

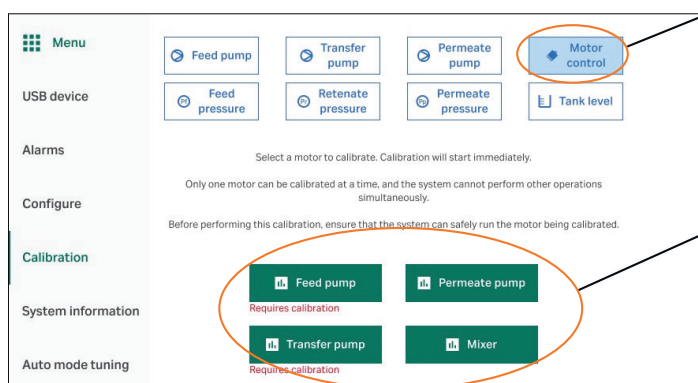
Contact Cytiva for a full-range calibration for the following sensors:

- Feed pressure sensor **Pf**
- Permeate pressure sensor **Pp**
- Retentate pressure sensor **Pr**

6.4.5 Motor control

A motor control calibration is performed in order to recognize which motors that are connected to the system and shall always be performed when the optional transfer or permeate pump is installed. Follow the instructions below to perform the motor control.

Step	Action
1	Tap Settings on the main screen.
2	Tap Calibration .
3	Tap Motor control (1).
	
4	Tap (2) the Feed pump , Permeate pump , Transfer pump , or the Mixer , depending on which of the motors you intend to calibrate.



Result:

The selected motor calibrates itself by starting on the lowest rotation speed and accelerating to the highest rotation speed.

6.4.6 Tank level

Tank balance

It is recommended to calibrate the tank balance prior to each run to obtain a reliable output. The tank balance must also be calibrated every time the system has been moved, or if there has been any interference with the balance.

Note: Do not interfere with the tank balance during the calibration procedure and filter run.

Calibrate the tank level

Step	Action
1	Tap Settings on the main screen.
2	Tap Calibration .
3	Tap Tank level .

Menu

USB device

Alarms

Configure

Calibration

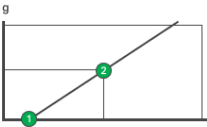
System information

Auto mode tuning

Calibration settings

Feed pump	Transfer pump	Permeate pump	Motor control
Feed pressure	Retenate pressure	Permeate pressure	Tank level

g



ADC

Last calibration:

1.	36030 ADC	0 g
2.	36902 ADC	501 g

Current:

38183 ADC	302 g
-----------	-------

Step #1:

Empty all liquid from tank then press 'Enter'

1

0 g

Enter

Step #2:

Add a known mass liquid into tank, enter mass below then press 'Enter'

2

501 g

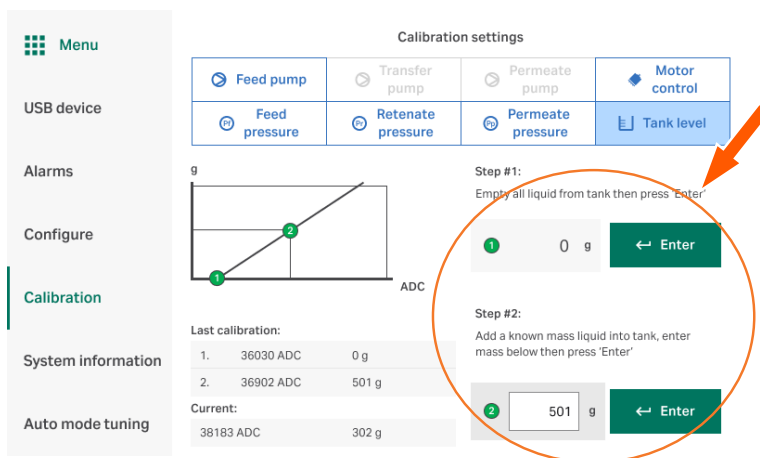
Enter

4

Empty the tank.

Step	Action
------	--------

- | | |
|---|---|
| 5 | Tap the gray field indicated with ❶ in Step #1: panel. |
|---|---|



- | | |
|----|---|
| 6 | Tap Enter in Step #1: panel for zero point calibration. |
| 7 | Fill in the tank with a known mass of water measured from a measuring jar. |
| 8 | Tap the gray field indicated with ❷ in Step #2: panel.
Set the value using the keypad. For an instruction how to use set-points, see Adjust set-points, on page 177 . |
| 9 | Tap Enter in Step #2: panel.
<i>Result:</i>
The software calculates the calibration and saves the data. |
| 10 | Check that the mass reading is correct by emptying the tank. Read the value on the main screen. The value should be zero. |

7 Operation

About this chapter

This chapter provides the information required to operate ÄKTA flux s in a safe way.

In this chapter

Section	See page
7.1 Start the system	140
7.2 Perform a run	143
7.3 Procedures after the run	163

Precautions



WARNING

Before performing any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in [Chapter 2 Safety instructions, on page 11](#), as listed below:



WARNING

Never exceed the operating limits stated in this document and on the system label. Operation of the product outside these limits can damage equipment and cause personal injury or death.

7.1 Start the system

Precautions



WARNING

Do not use the product if it is not working correctly, or if it has suffered any damage, including:

- damage to the power cord or its plug,
- damage caused by dropping the product,
- damage caused by splashing liquid onto the product.



WARNING

Make sure integrity of flowpath through pre-run with harmless liquids before use and sanitization.



CAUTION

To prevent exposure to leaking hot fluids:

- Do not use non-approved tubing and components together with or inside the system.
- Maintenance and pump tubing replacement of the ÄKTA flux s must be scheduled on regular basis with a Cytiva representative and performed by properly trained personnel only.
- Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.



NOTICE

Only use specified chemicals that have been proven not to be harmful to the wetted parts of the unit.

Refer to [Section 11.4 Chemical resistance, on page 209](#) for more information.

Final checks before start

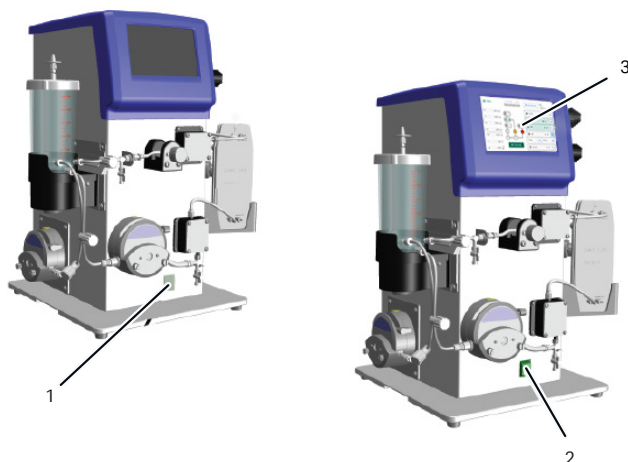


NOTICE

Make sure that the actions listed below are completed before ÄKTA flux s is started.

- Check that there is process liquid in the tank.
- Check that all inlets and outlets to the system are connected, closed or in appropriate state depending on the designed process. Inlets and outlets that are not in use must be closed.
- Check the condition of all connections and gaskets. Tighten connections and replace gaskets if needed.
- Check that only chemicals specified for the system are used.

System start up



Follow the steps below to start the system.

Step	Action
1	Switch on the power by turning on the power switch to the I position (1).
2	A green lamp (2) lights up.
3	Log in to the system, as described in Section 5.4.8 Set up the system computer, on page 97 .

7.2 Perform a run

Precautions



WARNING

Never block the outlet tubing and/or the check valves outlet with, for example, stop plugs, since this will create overpressure or hardware failure and can result in injury.



CAUTION

Risk of pinching by moving parts inside the tank or inside the pumps. Do not insert your fingers or other objects into the tank or other moving parts while ÄKTA flux s is powered.



CAUTION

Handle fluids with care when adding fluid to the system or collecting fluid from drain valves. Always use appropriate Personal Protective Equipment (PPE) when operating and interacting with ÄKTA flux s.



NOTICE

Make sure that the LUER lock cannot be opened by inadvertent twisting, bending or vibration connectors. Do not open connectors when pressurized or during on-going process.



NOTICE

Excessive temperatures can damage the equipment. Do not run the system at higher temperatures than the specified maximum operation temperature as stated on the system label.



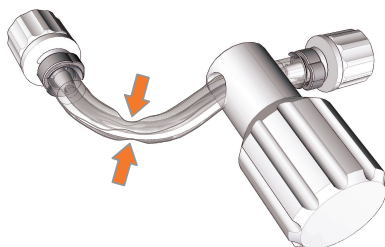
NOTICE

Blockage in the pump can cause overpressure.



NOTICE

Remove any dent in the tubing before the start of the filtering process.



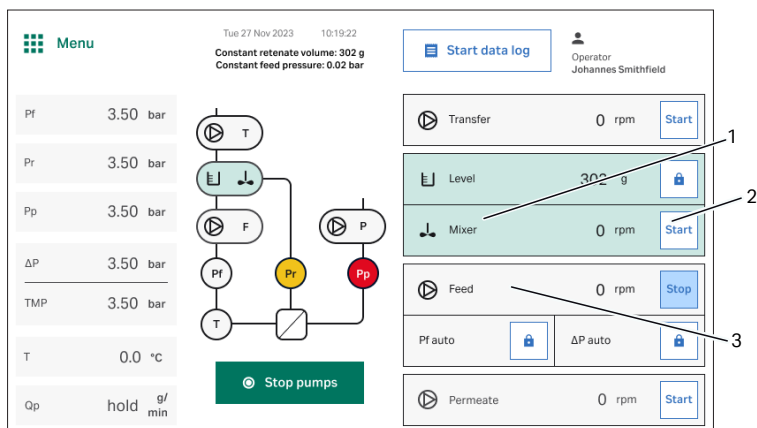
In this section

Section		See page
7.2.1	Basic filtration	145
7.2.2	Automated features	146
7.2.3	Data logging	151
7.2.4	Stopping the process	160
7.2.5	Shutdown ÄKTA flux s	161

7.2.1 Basic filtration

Follow the steps below to perform a basic filtration.

Step	Action
1	Fill the tank.
2	Tap Mixer (1) on the control panel.
3	Use the displayed keypad to set the desired mixer speed (rpm) and tap OK . For an instruction how to use set-points, see Adjust set-points, on page 177 .
4	Tap Start mixer (2). <i>Result:</i> The software increases the mixer speed to match the set speed.
5	Check that the retentate pressure control valve is fully open and that the recirculation path (from tank and back to tank again) is completely open.
6	Tap Feed (3).
7	Use the displayed keypad to set the desired feed pump speed (rpm) and tap OK .
8	Tap Start feed pump. <i>Result:</i> The software increases the feed pump speed to match the set speed. The software will begin to calculate the estimated permeate flux and the actual measured feed pressure(s) will be displayed.
9	If desired, use the retentate pressure control valve to adjust the pressure.



7.2.2 Automated features

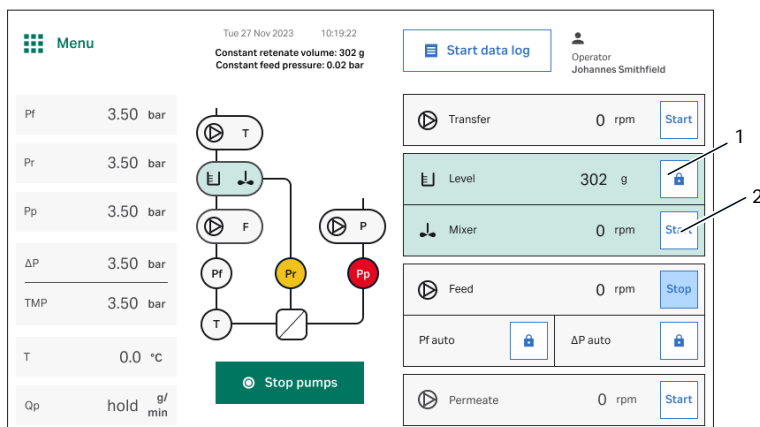
Constant retentate volume

The transfer pump and the **Level** functionality are used to maintain a constant retentate volume (CRV) in the tank. Follow the steps below to activate the CRV functionality.

- Note:**
- It is not recommended to use the CRV functionality with a low volume in the tank (< 1 L). If necessary, use a low feed flow when the tank volume is less than 1 L.
 - The CRV QP function is valid within 120 sec after the start of the measurement with $\pm 10\%$ of volume set point for a flow in the range 100 to 1000 mL/min.

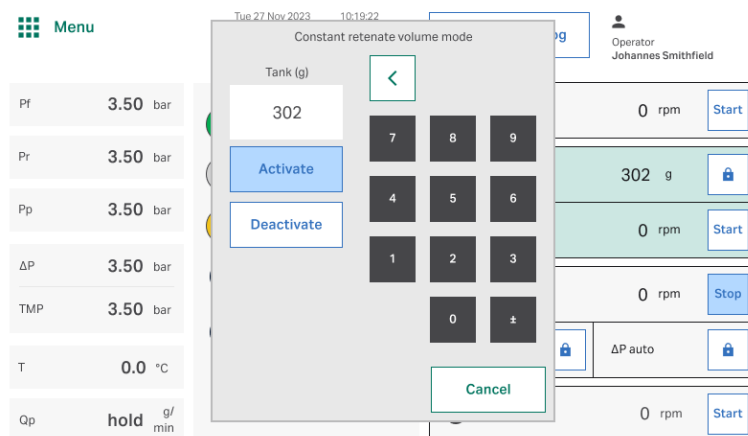
Step	Action
------	--------

- | | |
|---|--|
| 1 | Tap Lock button (1) on Level on the control panel. |
|---|--|



Step	Action
------	--------

- | | |
|---|---|
| 2 | Use the displayed keypad to insert set-points for the constant retentate volume and tap Activate . |
|---|---|



- | | |
|---|---|
| 3 | Tap Start (2) to activate the mixer. |
|---|---|

Result:

The volume in the tank is maintained at the selected amount.

- | | |
|---|---|
| 4 | To stop the CRV functionality, tap Lock button and tap Deactivate . |
|---|---|

Note:

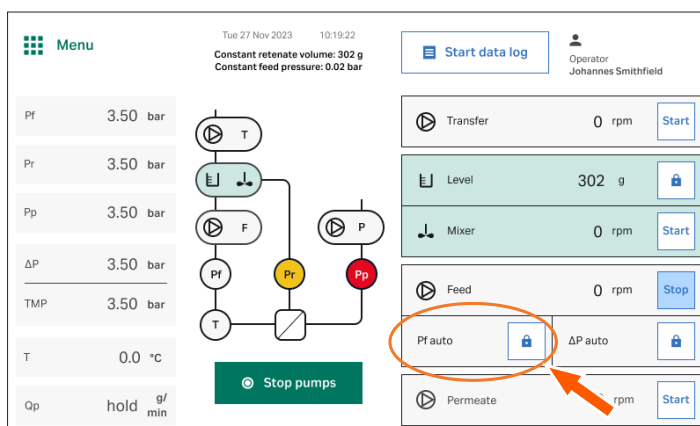
While CRV is enabled, the CRV related warnings do not stop the run. Activate the tank low level alarm to stop the run in case of low volume in the tank.

Pf control

The feed pressure can be used to control the feed flow rate. To do this, follow the steps below.

Step	Action
------	--------

- | | |
|---|--|
| 1 | Perform a basic filtration, refer to step 1 to 5 in Section 7.2.1 Basic filtration, on page 145 . |
| 2 | Tap Lock button next to Pf auto on the control panel, and set constant pressure on the keypad that appears and tap Activate . |



- | | |
|---|--|
| 3 | Tap Deactivate to stop the feed pressure control. |
|---|--|

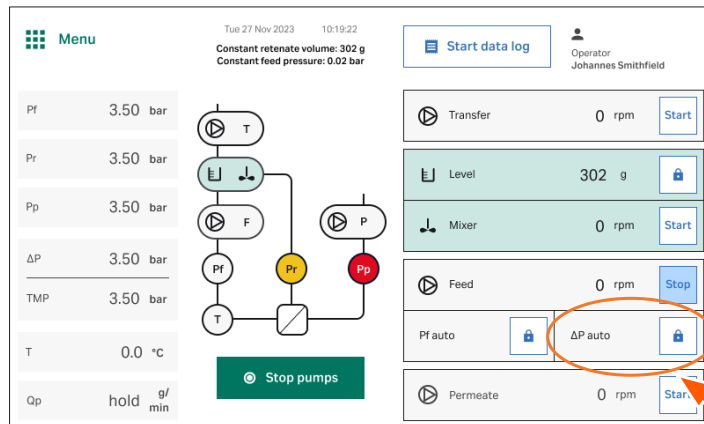
ΔP auto

The delta pressure, measured by the feed and retentate pressure sensors, can be used to control the feed flow rate. To do this, follow the steps below.

Auto delta pressure works between feed flow rate from 0.4 L/min to 6 L/min with tolerance of ± 0.3 bar.

Step	Action
------	--------

- | | |
|---|---|
| 1 | Perform a basic filtration, see steps 1 to 5 in Section 7.2.1 Basic filtration, on page 145 . |
| 2 | Tap the Lock button next to the ΔP auto pressure on the control panel. Set the value on the keypad that appears and press Activate . |



- | | |
|---|---|
| 3 | To stop the function, tap the Lock button and tap Deactivate on the displayed keypad. |
|---|---|

Note:

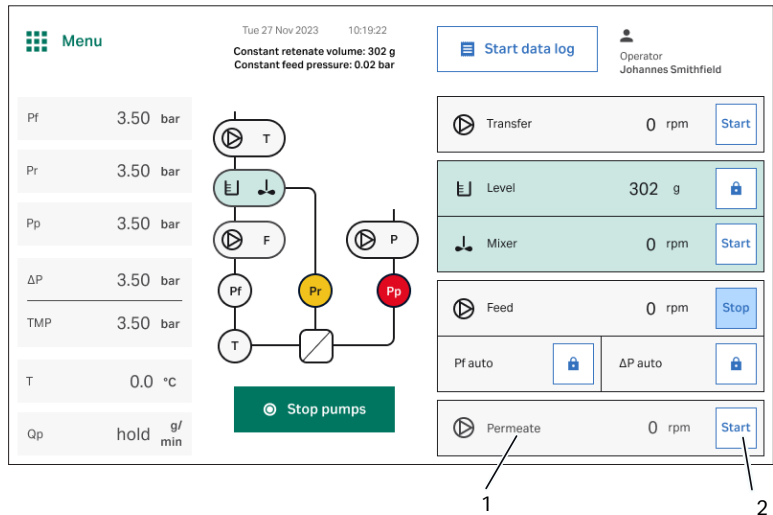
When using delta pressure to control the feed flow, the pressure control valve must be closed slowly to avoid large fluctuations in pressure.

Constant permeate flow

The following steps are required when the optional permeate pump is installed. Make sure that the feed pump is running at stable conditions before starting the permeate pump. To do this, follow the steps below.

Step	Action
------	--------

- | | |
|---|---|
| 1 | Tap Permeate (1) on the control panel. |
|---|---|



- | | |
|---|---|
| 2 | Use the displayed keypad to set the desired permeate pump speed (rpm) and tap OK .
For an instruction how to use set-points, see Adjust set-points, on page 177 . |
| 3 | Tap Start (2). |

Result:

The software increases or decreases the permeate pump speed to match the set speed.

7.2.3 Data logging

Introduction

The run data can be transferred using a ethernet connection. The file format is either CSV (Comma-separated values), or PDF. The CSV file format can be read by applications such as Microsoft Excel.

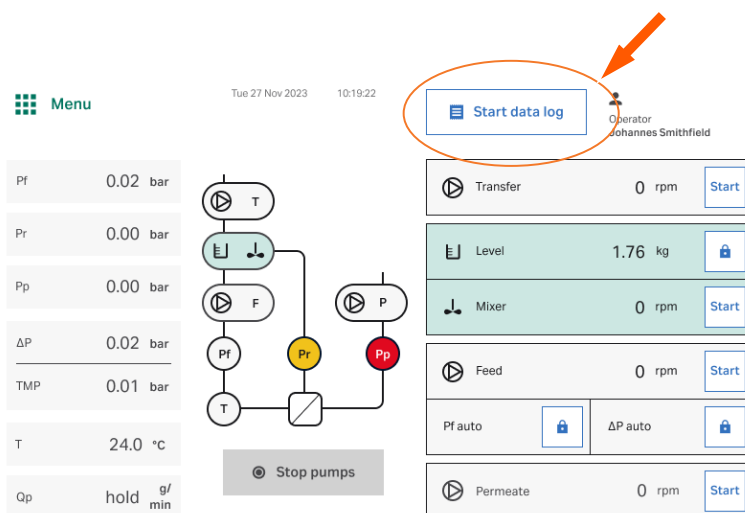
The CSV files and the database backup files are created locally on the instrument. The files have unique names. The system informs the user to back up their files at configured network drive when the system memory limit is approaching. Once available system memory limit is reached, the system starts to overwrite the oldest files with new files.

Create run report log file

The data logging option is found under the **Application** menu. Follow the steps below to create a run report file.

Step	Action
------	--------

1	In the main menu, tap Applications → Start data log .
---	---



Result:

Data is captured from the current run.

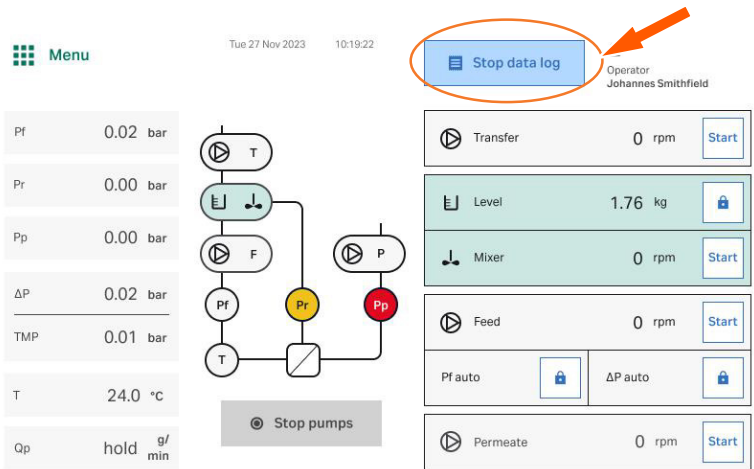
Step Action



IMPORTANT

It is not possible to generate data or start data logging after a run is completed.

2 To end data logging, tap **Stop data log**.



Note:

Data logging can be stopped any time during a run.

Configure Network settings

Follow the steps below to configure the **Network settings**.

Note: Before configuring the **Network settings** create shared folders for **Log files**, **Database**, and **Audit trails** locally.

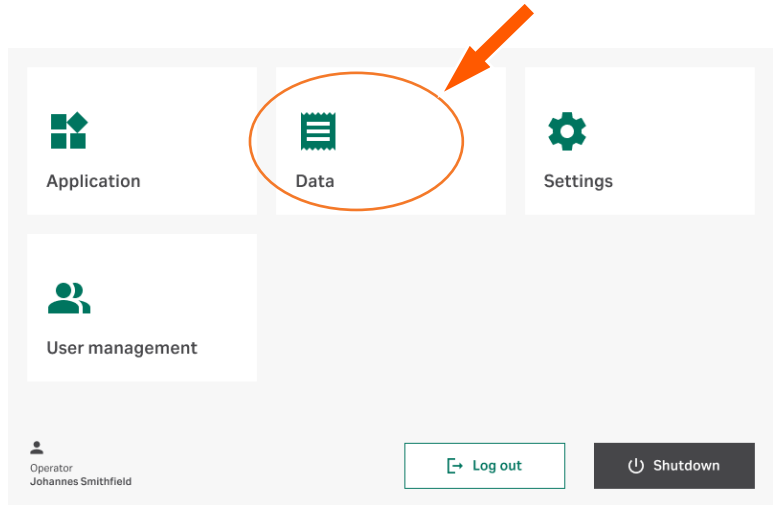
Note: The **Network settings** must be configured separately for the **Log files**, the **Audit trails**, and the **Database** sub menus.

Step Action

1 Connect the Ethernet cable.

Step	Action
------	--------

2	In the main menu, tap Data → Log files .
---	--



3	Tap Network settings .
---	-------------------------------



Result:

The network settings screen opens.



4	Enter the required information for the following fields:
---	--

- **IP address**
- **Username**
- **Password**
- **Shared location**
- **Log subfolder**

Step	Action
------	--------

Network settings	
IP address *	Username *
<div>10.120.23.0</div>	<div>johannes.smithfield@cytiva.com</div>
Shared location (folder1\folder2) *	Password *
<div>X:\yyy\zzz</div>	<div>***** </div>
Log subfolder	
<div>X:\yyy\zzz\lu</div>	
<div>Cancel</div>	<div> Save</div>

- 5 Tap **Save**.
- Result:
The network drive is now configured for log files.
- 6 Repeat steps 1-5 to configure the network drive for **Audit trails**, and **Database**.
- Note:
The **Log subfolder** is replaced by the **Audit trail subfolder** and the **Database subfolder** when the **Network settings** is configured for **Audit trails** and **Database** respectively.

Network settings	
IP address *	Username *
<div>10.120.23.0</div>	<div>johannes.smithfield@cytiva.com</div>
Shared location (folder1\folder2) *	Password *
<div>X:\yyy\zzz</div>	<div>***** </div>
Audit trail subfolder	
<div>X:\yyy\zzz\lu</div>	
<div>Cancel</div>	<div> Save</div>

Step	Action
------	--------

Network settings	
IP address * <input type="text" value="10.120.23.0"/>	Username * <input type="text" value="johannes.smithfield@cytiva.com"/>
Shared location (folder1\folder2) * <input type="text" value="X:\yyy\zzz"/>	Password * <input type="password" value="*****"/>
Database subfolder <input type="text" value="X:\yyy\zzz\lu"/>	
<input type="button" value="Cancel"/>	<input type="button" value="Save"/>

Note:

The user activities are automatically logged by the software in the audit trails folder. Make sure to take back up of the audit trails log at regular intervals to avoid high volumes of data transfer. The user can not use the software during an ongoing data transfer.

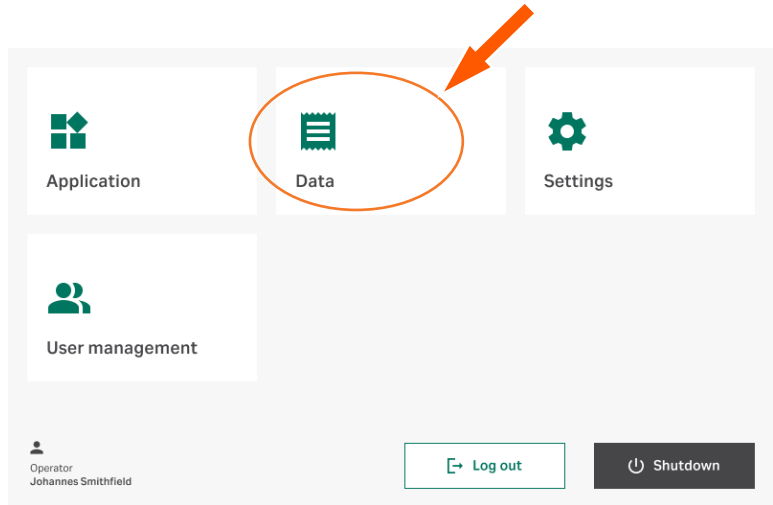
Export log file

The log files can be exported either in CSV, or PDF formats. Follow the steps below to export a log file.

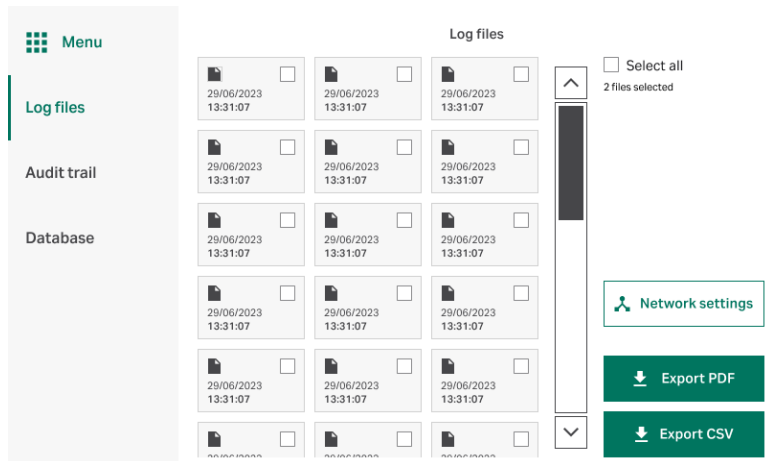
Note: Make sure to configure the **Network settings** before exporting log files.

Step	Action
------	--------

1	In the main menu, tap Data → Log files .
---	--



2	Tap to select the files you want to export.
---	---



3	Tap Export PDF or Export CSV .
---	--

Result:

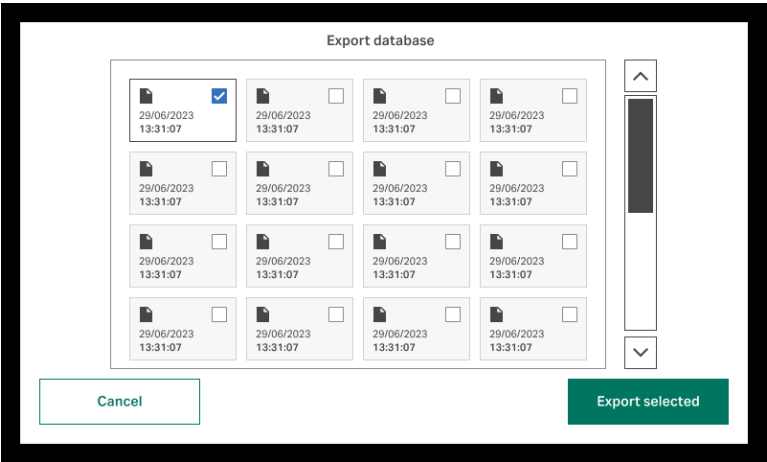
The selected log files are exported to the network drive.

Export database

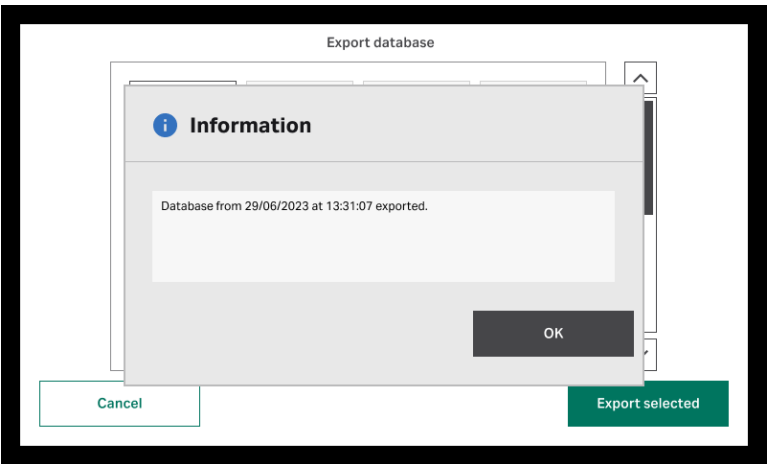
Follow the steps below to export database.

Note: Make sure to configure the **Network settings** before exporting a database.
For instructions, see [Configure Network settings, on page 152](#)

Step	Action
1	In the main menu, tap Data → Database .
2	Tap to select the files you want to export.



- 3 Tap **Export selected**.
- 4 Tap **OK** in the screen below.



Step	Action
------	--------

Result:

The selected database is exported to the configured network drive in .db format.

Restore database

The **Restore database** functionality is used to import the backup files from the network location to the instrument. The files are stored in a temporary location in the instrument. Follow the steps below to restore a database.

Step	Action
------	--------

1 Connect the Ethernet cable.

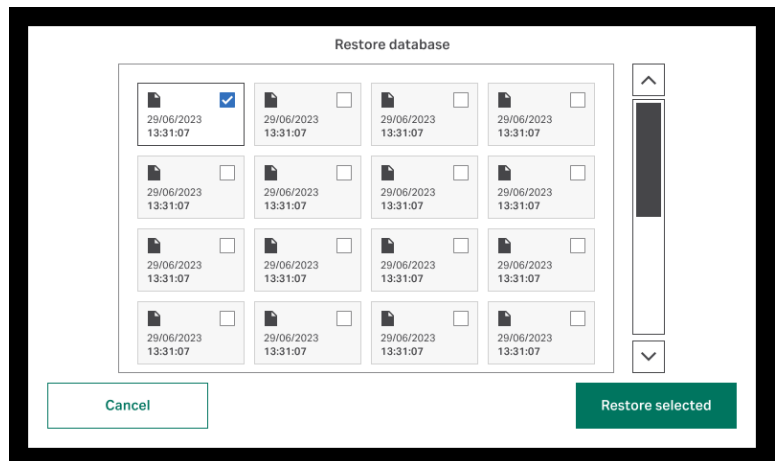
Note:

The connected network drive must have a valid database file such as, `aktafluxdatabase.db` or `aktafluxdatabase_20240312T163315.db.bak`.

2 In the main menu, tap **Data** → **Database** → **Restore database**.

3 Tap to select the file you want to import.

4 Tap **Restore database**.



5 Tap **Yes** in the confirmation screen.

Note:

Restoring the database erases the user on the instrument data permanently. Make sure to backup all user data.

6 Tap **OK** when the progress bar has reached 100%.

Step	Action
------	--------

Result:




The system is restarted and the application starts with updated database.

Note:

Notify the users that the files on the instrument are replaced by the imported files.

7.2.4 Stopping the process

The table below shows how to end a run.

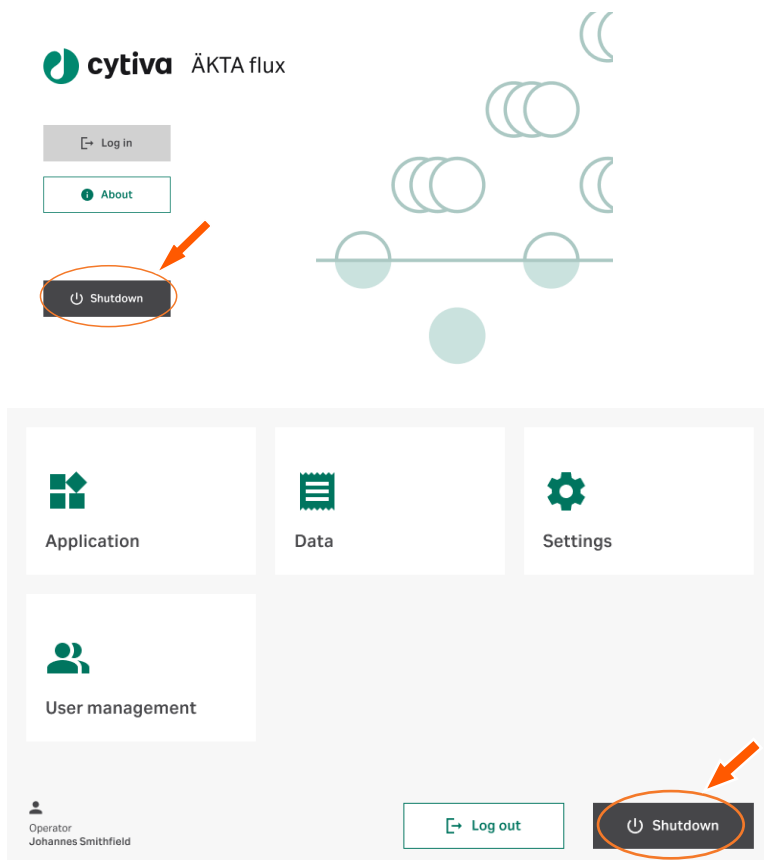
Button	Function
	A run can be ended at any time. To end a run, tap Stop button for the running process.
 	<p>The pumps can be stopped at any time by tapping the Stop Pumps button on the main screen.</p> <p>All running pumps on the system are stopped. A red circle is shown on the Start button.</p> <p>Use the Stop Pumps button if the pumps are required to be stopped quickly during an unexpected occurrence.</p> <p>The Stop button is recommended under normal use.</p>

7.2.5 Shutdown ÄKTA flux s

Follow the instructions below to shut down the system.

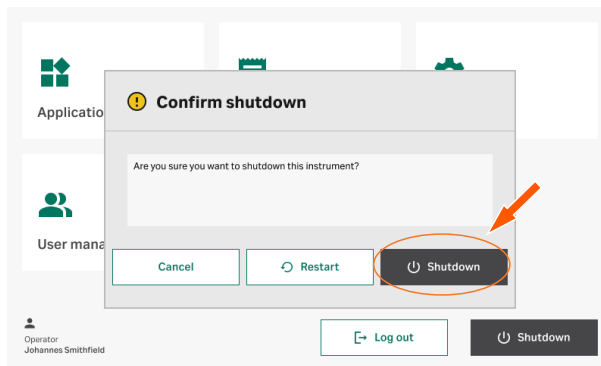
Step	Action
------	--------

- | | |
|---|--|
| 1 | Tap Shutdown either on the login screen, or the main menu screen. |
|---|--|



Step	Action
------	--------

- | | |
|---|---|
| 2 | Tap Shutdown in the pop-up window. |
|---|---|



Note:

To restart the system, tap **Restart**, and do not proceed to step 3.

- | | |
|---|--|
| 3 | When the blinking cursor has disappeared from the screen, press the 0 position on the power switch. |
|---|--|

7.3 Procedures after the run

Introduction

The procedures after the run must be performed in the following order:

1. Empty the system.
2. Clean the system and filters after every run.
3. Prepare ÄKTA flux s for storage.

Precautions



CAUTION

Let the ÄKTA flux s cool down after use as the components and internal compartments can become hot during use.



CAUTION

Make sure the control valve is released when there is no active filtration.

Empty the system

Empty the system by:

- Open the upper and lower drain valve.
- Run feed pump at low velocity until the system is empty.
- Shut down the pump.
- Open the pressure control valves.



NOTICE

Make sure the pressure control valves not are pinching the tubing while there is no filtration. The tubing can be deformed.

CIP

Perform CIP after the run, see [Section 9.3 Sanitization and cleaning, on page 185](#).

Clean the filters

Clean the filters according to instructions from the manufacturer.

Prepare for storage

If needed, prepare the system for storage as described in [Section 9.4 Storage, on page 192](#).

8 Settings

About this chapter

This chapter describes the submenus in **Settings**. It also includes a description on how to change the settings of the parameters.

Note: *The images used in this chapter are for reference purpose only.*

In this chapter

Section		See page
8.1	Configure Alarms screen	166
8.2	Configure System screen	170
8.3	Calibration screen	173
8.4	System information screen	174
8.5	Set-points	177

8.1 **Configure Alarms** screen

Precautions



WARNING

All alarm signals must be set within the limits specified in the system documentation. Pressure and temperature control must be activated while the system is in use to prevent the tubing system to leak or break.

Warnings and alarms

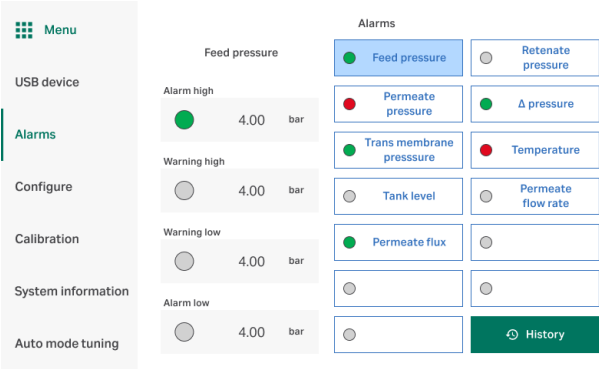
The ÄKTA flux s instrument can generate the following types of warnings and alarms.

If...	Then
Process related warning The warning level has been configured by the user in Configure Alarms screen.	The triggered warning is displayed on the main screen and ÄKTA flux s keeps running.
Process related alarm The alarm level has been configured by the user in Configure Alarms screen.	The triggered alarm is displayed on the main screen and stops the feed pump (and transfer and permeate pumps, if applicable) and thereby pausing the process until manual interaction.
System related warning The warning message concerns an internal error in the system.	The triggered warning is displayed on the main screen and ÄKTA flux s keeps running.
System related alarm The alarm is generated from the internal system.	The triggered alarm is displayed on the main screen and stops the feed pump (and transfer and permeate pumps, if applicable) and thereby pausing the process until manual interaction.

Process related warnings and alarms

For all parameters shown on the right hand side of the **Configure Alarms** screen, a definition of warnings and alarms can be set, both on high and low levels.

The illustration below shows an example of a screen for setting of **Feed Pressure** alarms.



See the table below for an overview of the possible alarm or warning settings of each parameter.



Parameter	Alarm High	Alarm Low	Warning High	Warning Low
Feed pressure	X	X	X	X
Retentate pressure	X	X	X	X
Permeate pressure	X	X	X	X
Temperature			X	X
Permeate Flow Rate			X	X
Permeate Flux			X	X
Tank Level	X	X	X	X

Note: The **Alarm High** settings for **Feed Pressure**, **Retentate Pressure** and **Permeate Pressure** can be adjusted, but can never be set to a value higher than the highest system pressure (4 bar) bar and cannot be disabled. A high alarm setting is always active as a pressure cutout for safety reasons for these parameters.

Alarm indicators

The table below describes the different indicator colors.

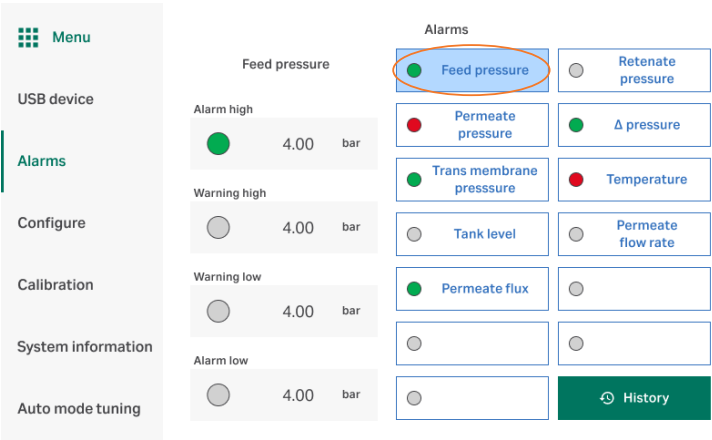
Part	Function
	A blank indicator means that no warning or alarm is set for the parameter.

Part	Function
	A green indicator shows that at least one high or low warning or alarm has been set for the parameter.
	A red indicator shows that an alarm or a warning is triggered.

Set system alarm parameters

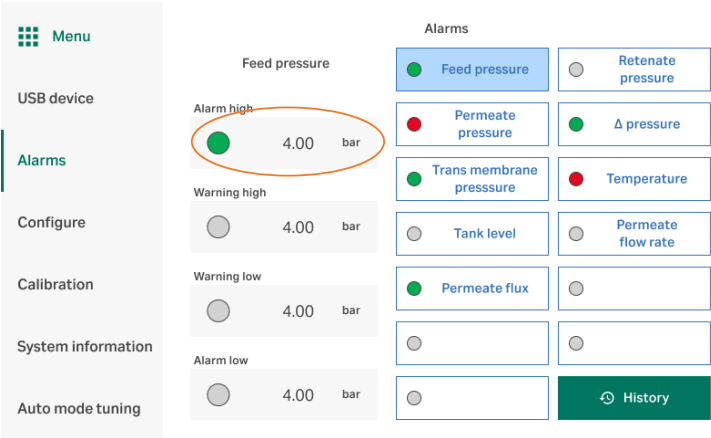
The example below shows how the **Alarm High** is set for feed pressure.

Step	Action
1	Tap Settings on the main screen.
2	Tap Alarms .
3	Tap Feed pressure on the right hand of the screen.



- 4 Tap the **Alarm high** button. Use the **-** or **+**, or the display keypad to set the relevant pressure values.
For an instruction how to use set-points, see [Adjust set-points, on page 177](#).

Step	Action
------	--------



- 5 The **Feed pressure** indicator turns green showing that an alarm high is triggered.
- Note:**
- To deactivate an alarm or warning tap the activated alarm and check that the indicator turns white.*

8.2 Configure System screen

System parameters

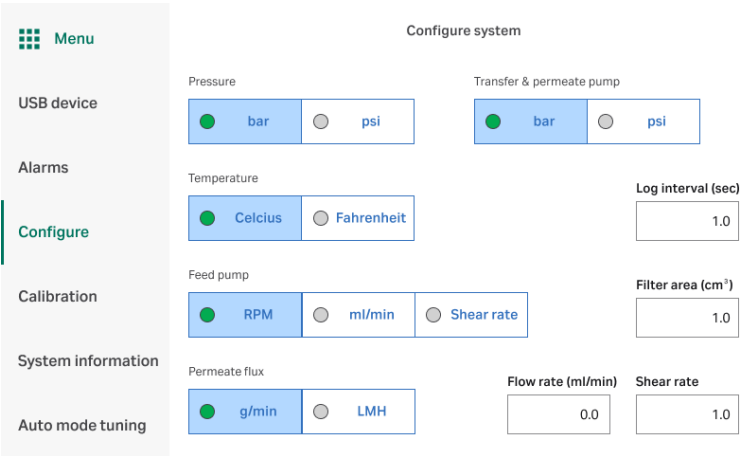
User configuration of system parameter units is set from the **Configure system** screen. The following units can be configured:

Parameter	Units
Pressure	bar, psi
Temperature	Celsius, Fahrenheit
Feed pump	RPM, mL/min, Shear Rate
Permeate flux	g/min, LMH
Transfer & permeate pump	bar, psi

Set units

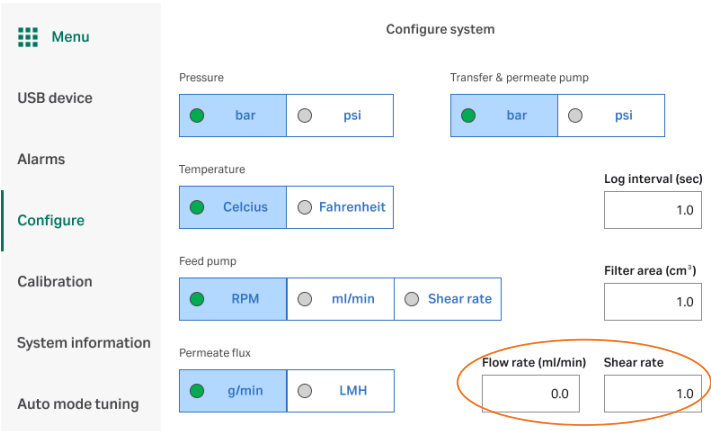
Follow the instructions below to set the units.

Step	Action
1	Tap Settings on the main screen.
2	Tap Configure .
3	Tap the system parameter button you want to set.

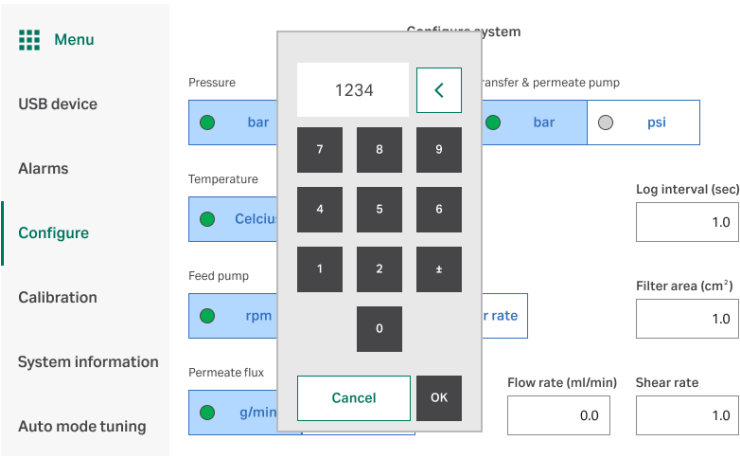


Result:
The indicator on the selected button turns green.

- | Step | Action |
|------|---|
| 4 | If Shear rate is chosen as the unit for Feed pump , you also have to set the values for Flow rate (mL/min) , and the corresponding Shear rate (values provided by the hollow fiber manufacturer). |



- 5 Tap the **Flow Rate (mL/min)** field and the **Shear rate** field to set the preferred values with the displayed keypad. Digits can be deleted using the arrow sign button in the upper right corner of the keypad.



The table below describes the nominal cartridge feed flow rate and pressure drop as a function of shear rate.

Step Action

Style	Nominal Lumen ID (mm)	Shear Rate of 2000 sec ⁻¹	Shear Rate of 4000 sec ⁻¹	Shear Rate of 8000 sec ⁻¹	Shear Rate of 16000 sec ⁻¹
		Flow (mL/min)	Flow (mL/min)	Flow (mL/min)	Flow (mL/min)
MM	0.5	12.5	25	50	100
	0.75	20	40	80	160
	1	25	50	100	200
H22LA	0.75	10	20	40	80
	1	25	50	100	200
H42LA	0.5	4	8.5	17	33
	1	25	50	100	200
AXH or H24LA	0.5	8.5	17	33	66
AXM	0.5	25	50	100	200
	0.75	40	80	160	320
	1	70	140	280	560

- 6 Tap **OK** to save the settings.
- 7 Tap **Cancel** to close the displayed keypad without saving.
- 8 If **LMH** is chosen as the unit for **Permeate flux**, tap the **Filter Area (cm³)** field and use the keypad to set the preferred value.

8.3 **Calibration** screen

All the pumps, the pressure sensors and the tank level can be calibrated from the **Calibration** screen. For information on how to perform calibration in ÄKTA flux s, see [Section 6.4 Calibration, on page 119](#).

The illustration below is an example of a calibration screen.

Menu

USB device

Alarms

Configure

Calibration

System information

Auto mode tuning

Feed pump

Transfer pump

Permeate pump

Motor control

Feed pressure

Retenate pressure

Permeate pressure

Tank level

ml/min

RPM

1

2

Last calibration:

Current:

1 0 rpm 0.0 ml/min

2 0 rpm 0.0 ml/min

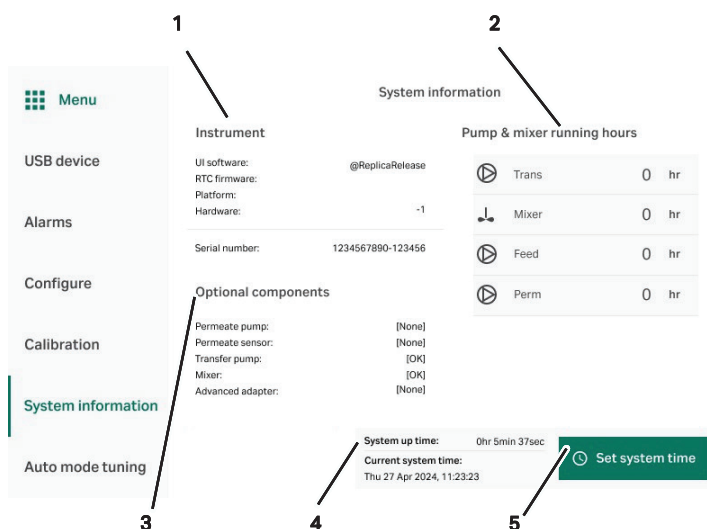
Pressure 0.0 bar

← Enter

8.4 **System information** screen

Overview

The **System information** panels provide information on the different parts of the system. See the screen and table below for descriptions.



Part	Function	Description
1	Instrument panel	Provides information about installed software and the serial number of the system.
2	Pump & mixer running hours	Overview of the running hours of pumps and mixer.
3	Optional components panel	Provides information of the following components: <ul style="list-style-type: none"> • Permeate pump • Permeate sensor • Transfer pump Available components are indicated with OK . Missing components are indicated with None .
4	System up time and Current system time panel	Shows the system up time and the current system time.

Part	Function	Description
5	Set system time button	Sub-menu to set the system date and time, see instructions below.

Set system date and time

Follow the instructions below to set the system time and date.

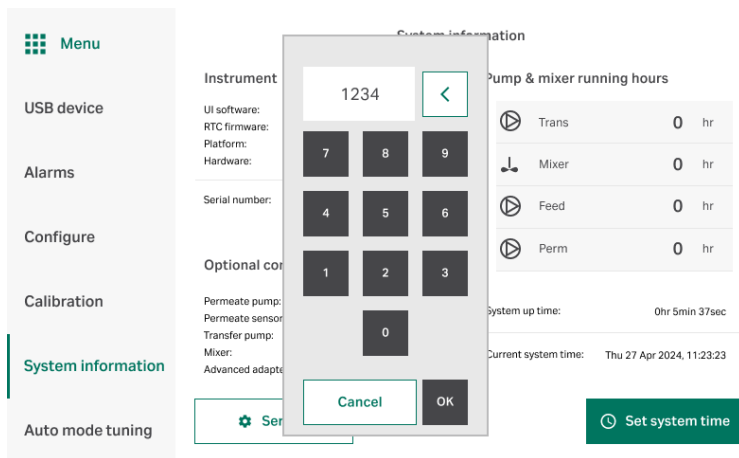
Step	Action
------	--------

- | | |
|---|--|
| 1 | Login with appropriate user account. |
| 2 | In the main menu, tap Settings → System information . |
| 3 | Tap Set system time . |
| 4 | Tap the Date fields day , month and year to set the date, and the Time fields hour and minutes to set the time. |

The screenshot shows the 'System information' screen with a modal dialog for setting the system date and time. The dialog has two sections: 'Date' and 'Time'. The 'Date' section has three input fields for 'day' (15), 'month' (08), and 'year' (2023). The 'Time' section has two input fields for 'hour' (15) and 'minutes' (08). Below these fields are 'Cancel' and 'OK' buttons. The background screen shows various system information fields like 'Instrument', 'UI software', 'RTC firmware', 'Pump & mixer running hours', 'Mixer', 'Advanced adapter', and 'Current system time'.

Step	Action
------	--------

- | | |
|---|--|
| 5 | Use the keypad to enter new values. Digits can be deleted using the arrow sign button in the upper right corner of the keypad. |
|---|--|



- | | |
|---|---|
| 6 | Tap OK . |
| 7 | Tap Cancel to close the keypad set without saving. |

8.5 Set-points

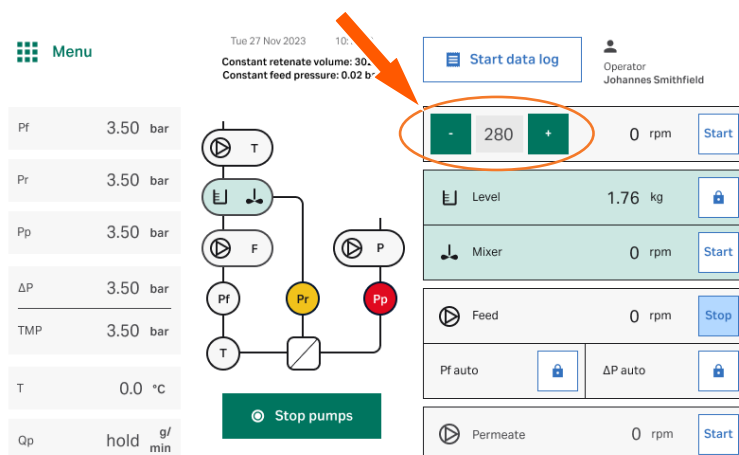
Introduction

This section describes how to enter set-points for **Transfer**, **Level**, **Mixer**, **Feed**, **Pf auto**, **ΔP auto**, and **Permeate**.

Adjust set-points

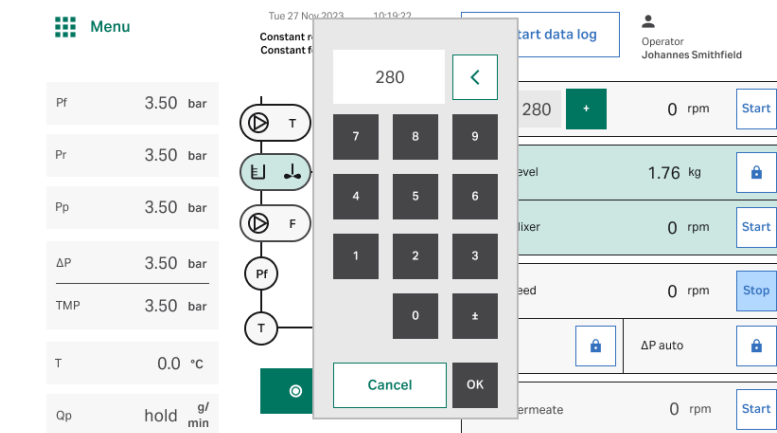
Follow the steps below to adjust the set-points.

- | Step | Action |
|------|---|
| 1 | On the main screen, tap Applications . |
| 2 | <ul style="list-style-type: none"> Tap the button with parameter name (e.g. Transfer, Mixer, or Permeate). If the button contains a lock symbol (e.g Level, Pf auto, or ΔP auto), tap the lock button. |
| 3 | <ul style="list-style-type: none"> Set the parameter using the - or + buttons. |



- Alternatively, tap the gray field and set the preferred values by using the displayed keypad. Digits can be deleted using the arrow button (<) in the upper right corner of the keypad.

Step Action



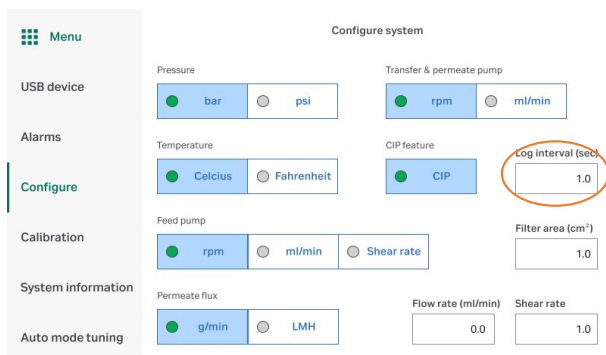
- 4 Tap **OK** to save the settings.
- 5 Tap **Cancel** to close the keypad without saving.

Configure Log Interval

To set the interval for data logging, follow the steps below.

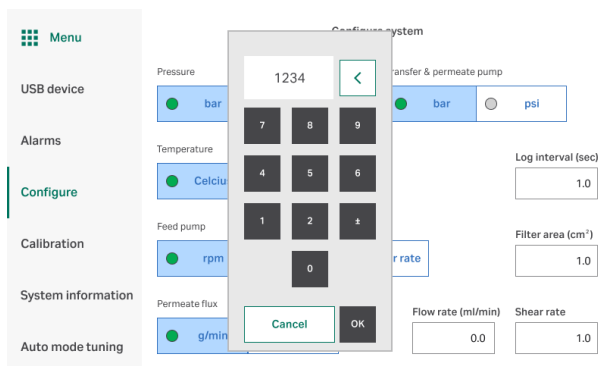
Step Action

- 1 In the main menu, tap **Settings** → **Configure**.
- 2 Tap **Log Interval (sec)**.



Step	Action
------	--------

3	Enter the time interval and tap OK .
---	---



Result:

A run report is recorded during the selected log interval.

9 Maintenance

About this chapter

This chapter provides required information to enable users and service personnel to maintain ÄKTA flux s.

In this chapter

Section	See page
9.1 Service and preventive maintenance	182
9.2 User maintenance schedule	183
9.3 Sanitization and cleaning	185
9.4 Storage	192
9.5 Repair and calibration	194
9.6 Replace mains fuse	195

Precautions



WARNING

Before performing any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in [Chapter 2 Safety instructions, on page 11](#), as listed below:

- [General precautions, on page 13](#)
- [Personal protection, on page 13](#)
- [Power supply, on page 17](#)
- [Maintenance, on page 19](#)



WARNING

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

**WARNING**

Periodically inspect the system's tubing, gaskets, seals, and connections for wear and damage to prevent leaks and the release of potentially hazardous fluids.

**WARNING**

Before maintenance/service is performed, the system owner must first clean the system and complete a Health & Safety Declaration Form. Contact Cytiva for further information.

9.1 Service and preventive maintenance

Introduction

Regular service and maintenance is necessary to maintain optimal condition and to extend the operational lifetime of the components.

Service and preventive maintenance work must be performed according to Cytiva recommendations, and according to the maintenance instructions of the component manufacturers.

Service frequency

The requirements for frequency of service and preventive maintenance depend on the frequency of use and the specific applications performed.

A general recommendation is one service and preventive maintenance visit every two years. In certain cases an annual service and preventive maintenance visit is recommended. Adhere to the maintenance intervals.

Service agreements

Contact your Cytiva representative for information about frequency of service requirements to suit individual process needs and for details of the Cytiva service agreement options available.

To make the mutual protection and safety of Cytiva service personnel and our customers, 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 the Cytiva service 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. Also, knowledge of any additional hazards present at your site Cytiva is critical for services personnel.

9.2 User maintenance schedule

Introduction

The maintenance recommendations vary depending on how frequently you use your system. Note that the recommendation might not apply to your specific use of the system. The system owner is solely responsible for establishing applicable routines for periodic maintenance.

Precautions



WARNING

Maintenance should be scheduled regularly with Cytiva to assure a proper function of the system.



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.

Maintenance after each run or weekly

This section covers maintenance actions required for each run or weekly, depending on which happens first.

Component	Action
Complete system	Clean the system according to the procedure described in Section 9.3 Sanitization and cleaning, on page 185 .
Protective earth	Make sure that the protective earth wiring is not disconnected or damaged.
Tubing, connections and seals	Check for leakage. Replace seals if needed. Perform a leakage test at maximum operating pressure.

Maintenance annually or as needed

This table below covers maintenance actions that are required annually or as needed.

Component	Action
Complete system	A preventive maintenance test procedure on all systems, sensors, pumps, and valves must be performed annually by trained and certified personnel. Contact your local Cytiva representative. Replace all gaskets, O-rings, and valve or pressure sensor diaphragms.
Pump of peristaltic type	Replace all wear and tear parts.

9.3 Sanitization and cleaning

Precautions



WARNING

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

In ÄKTA flux s, prevent fluid leakage by tighten the Luer connection firmly. Do not open the Luer connection by twisting, bending or vibration. Do not open connectors when pressurized or during on-going process.

Sanitization

Sanitization is the use of chemical agents to reduce microbiological contamination to an acceptable level.

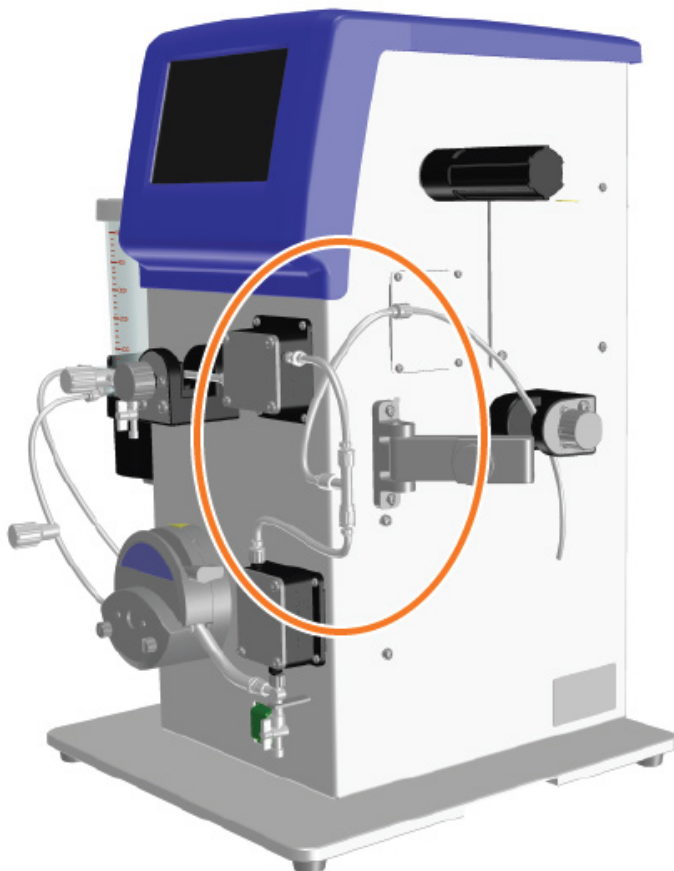
A sanitization procedure is used when there is a need to reduce microbiological levels, for example between product batches, or when there has been unwanted microbiological contamination.

Cleaning-in-place (CIP)

CIP is the removal of every kind of contaminant, protein, lipid, other particles and microorganisms.

CIP tubing

Replace the filter with the CIP tubing during cleaning.



CIP

ÄKTA flux s is cleaned by a CIP procedure with water and NaOH.

Follow the steps below to clean ÄKTA flux s. The steps are described in more detail on the following pages.

- A** Drain the system.
- B** Rinse with water.
- C** Rinse with water under pressure.
- D** Rinse again with water under pressure.
- E** Rinse with 0.5 M NaOH.

- F** Rinse under pressure with 0.5 M NaOH.
- G** Recirculate with 0.5 M NaOH for two hours.
- H** Neutralize with water of desired quality.

Note: *For improved cleaning effect, the 0.5 M NaOH solution may be heated to 50°C prior to pouring it to the tank.*

A – Drain the system

To drain the system, follow the steps below.

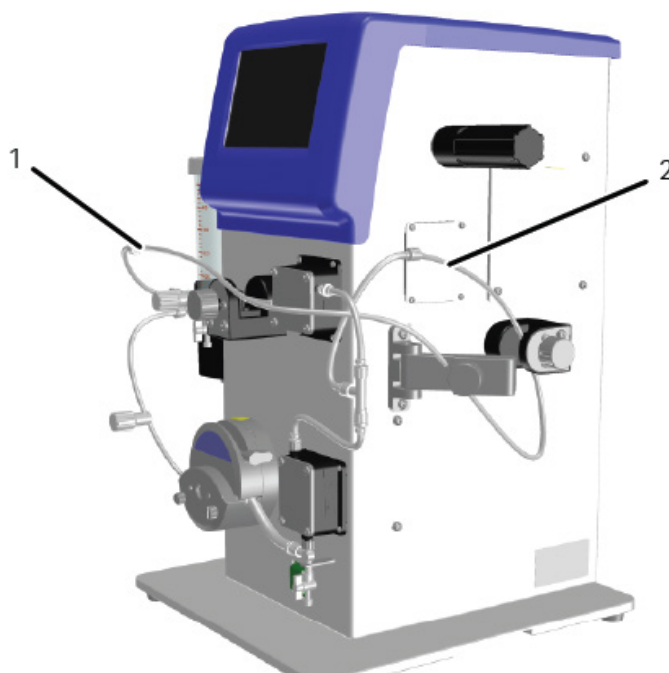
Step	Action
1	If any optional pumps are installed, disconnect the transfer pump tubing and/or the permeate pump tubing from the pumps.
2	Run the feed pump at low speed. Drain the system through lower drain valve.

B – Rinse with water

To rinse the system with water, follow the steps below.

Step	Action
1	Fill the tank with water.
2	Drain the system.

C – Rinse with water under pressure



To perform a rinse with water under pressure, follow the steps below.

Step	Action
1	Fill the tank with water.
2	If the optional pumps are installed, disconnect the transfer pump tubing from the transfer pump and the permeate pump tubing from the permeate pump.
3	Connect the transfer pump tubing (1) with the permeate pump tubing (2).
4	Recirculate the rinsing water for 5 minutes by running the feed pump at 75% of maximum speed. Increase the feed pressure to 2 bar with help of the retentate and permeate control valves.
5	Drain the system.

D – Rinse with water under pressure

Repeat the procedure described in [C – Rinse with water under pressure, on page 188](#).

E – Rinse with 0.5 M NaOH

To perform a rinse with 0.5 M NaOH, follow the steps below.

Step	Action
------	--------

1	Fill the tank with 0.5 M NaOH.
---	--------------------------------

2	Drain the system.
---	-------------------

F – Rinse with 0.5 M NaOH under pressure

To perform a rinse with 0.5 M NaOH under pressure, follow the steps below.

Step	Action
------	--------

1	Fill the tank with 0.5 M NaOH.
---	--------------------------------

2	If the optional pumps are installed, disconnect the transfer pump tubing from the transfer pump and the permeate pump tubing from the permeate pump.
---	--

3	Connect the transfer pump tubing (1) with the permeate pump tubing (2).
---	---

4	Recirculate the 0.5 M NaOH for 5 minutes by running the feed pump at 75% of maximum speed. Increase the feed pressure to 2 bar with help of the retentate and permeate control valves.
---	--

5	Drain the system.
---	-------------------

G – Recirculate with 0.5 M NaOH for two hours

To recirculate with 0.5 M NaOH, follow the steps below.

Step	Action
1	Fill the tank with 0.5 M NaOH.
2	If the optional pumps are installed, disconnect the transfer pump tubing from the transfer pump and the permeate pump tubing from the permeate pump.
3	Connect the transfer pump tubing (1) with the permeate pump tubing (2).
4	Flush the drain valves with 0.5 M NaOH, use about 50 mL liquid per drain valve.
5	Fill up the tank with 0.5 M NaOH and recirculate for 2 hours in the system by running feed pump at 75% of maximum speed. Increase the feed pressure to 2 bar with help of the retentate and permeate control valves.
6	Drain the system.

H – Neutralize with water

To neutralize the system with water, follow the steps below.

Step	Action
1	Fill the tank with water of desired quality.
2	If the optional pumps are installed, disconnect the transfer pump tubing from the transfer pump and the permeate pump tubing from the permeate pump.
3	Connect the transfer pump tubing (1) with the permeate pump tubing (2).
4	Recirculate for 5 minutes in the system by running the feed pump at 75% of maximum speed. Increase the feed pressure to 2 bar with help of the retentate and permeate control valves.
5	Drain the system.
6	Check the pH on the outlets (transfer and permeate pump tubing and valves). Stop rinsing when pH is neutral. Fill the tank with water if needed.

Cleaning external surfaces

The instrument is designed to be operated in a clean environment. The external surfaces must not accumulate any substantial amount of dust or dirt.

Wipe the outer surface of the instrument regularly with a clean cloth. If required, use water with a mild detergent followed by 70% ethanol. Regular wiping and care of the equipment can help keep prevent corrosion.

It is not recommended to spray or splash liquids on the external surfaces of the system.

Cleaning of components

All components can be cleaned with the most commonly used agents, such as detergents, 70% ethanol, weak acids, sodium hydroxide, and salt solutions.

For more information, see [Section 11.4 Chemical resistance, on page 209](#).

Cleaning of filters

- Cleaning procedures in *Kvick lab packet holder User Manual 11000386 AC*.
- Hollow fiber cartridges cleaning procedures are provided in the *Hollow fiber cartridges for membrane separations Operating handbook CY28744*.

Filter units provided by other manufacturers must be cleaned according to the instructions from the respective manufacturer.

Cleaning before planned maintenance/service

To protect the 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.

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.

9.4 Storage

Introduction

This section describes the procedures for storage of ÄKTA flux s.

Precautions



NOTICE

Fit protective caps on all electrical and optical connectors when not in use.



NOTICE

When the product is filled with a storage solution, the temperature must be high enough to prevent freezing, and low enough to prevent evaporation.

Storage requirements

Parameter	Allowed range
Ambient temperature, storage	-25°C to +50°C Temperature gradients of $\leq \pm 1^\circ\text{C}/\text{min}$ See detailed information in Operating limits, on page 202 .

Short term storage

The procedure described below is applicable for storage durations up to one month.

Step	Action
1	Perform cleaning as described in Section 9.3 Sanitization and cleaning, on page 185 .
2	Fill ÄKTA flux s with 20% ethanol to prevent microbial growth. Make sure that the filter cassettes are at least partially wetted during storage.
3	Seal off ÄKTA flux s to prevent contamination caused by the surrounding environment.

Step	Action
4	Release the tubing from the transfer and permeate pump heads by moving the lever from right to left, if these optional pumps are installed.

Long term storage

To prevent microbial growth, the storage solution must be replaced regularly if ÄKTA flux s is stored for long periods of time.

The procedure described below is applicable for storage duration longer than one month.

Step	Action
1	<p>Follow the steps below to empty the system.</p> <ol style="list-style-type: none"> Open the upper and lower drain valves. Run the feed pump at low velocity until the system is empty. Clear and dry lines with compressed gas. Shut down the pump. Release the pump tubing from the pump head by moving the top lever from right to left. Close the valves. Cover all un-connected connectors.
2	Perform the actions described for short term storage, see above.
3	<p>Place ÄKTA flux s in a dust free environment with well-controlled climate.</p> <p>The temperature should be in the range 4°C to 25°C and stable.</p> <p>The air humidity and air temperature differences should be kept as low as possible to prevent condensation and corrosion.</p>

9.5 Repair and calibration

Introduction

Components not covered in this manual can not be calibrated or repaired by the user. If any ÄKTA flux s components do not operate according to specifications, contact your Cytiva representative.



WARNING

Do not attempt to perform any actions not described in this document.

Always contact your Cytiva representative for advice if such a need should arise.

Filter integrity test

This method can be used to check that the filter is not damaged and that it has been mounted correctly.

See [Filter integrity test, on page 118](#).

9.6 Replace mains fuse

Introduction

A blown fuse might indicate the existence of another problem in the instrument. If a replacement fuse blows, do not replace it. Contact your Cytiva representative.

Precautions



WARNING

Always disconnect power to ÄKTA flux s before replacing fuses.

Replace the mains fuse

Note: A small screwdriver is used to remove the mains fuses.

Follow the steps below to replace the mains fuse.

The mains fuses are placed in a fuse drawer under the power supply input at the rear side of ÄKTA flux s.

Step	Action
------	--------

- | | |
|---|------------------------------|
| 1 | Disconnect the power supply. |
|---|------------------------------|

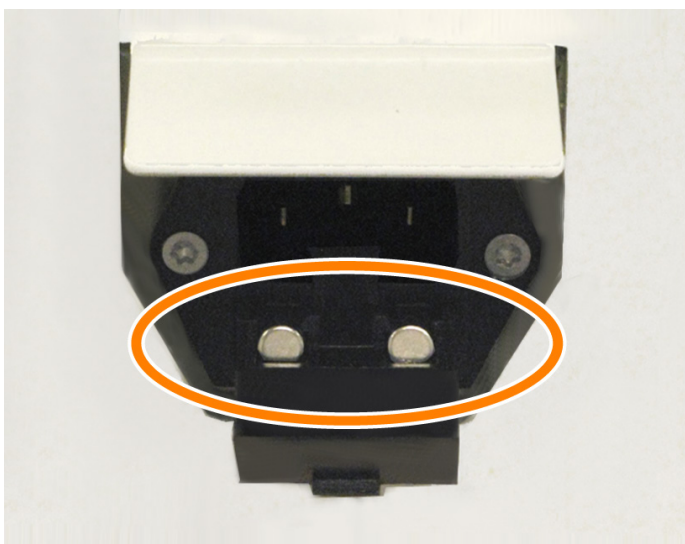


Step	Action
------	--------

- | | |
|---|-------------------------------------|
| 2 | Grip the fuse drawer and loosen it. |
|---|-------------------------------------|

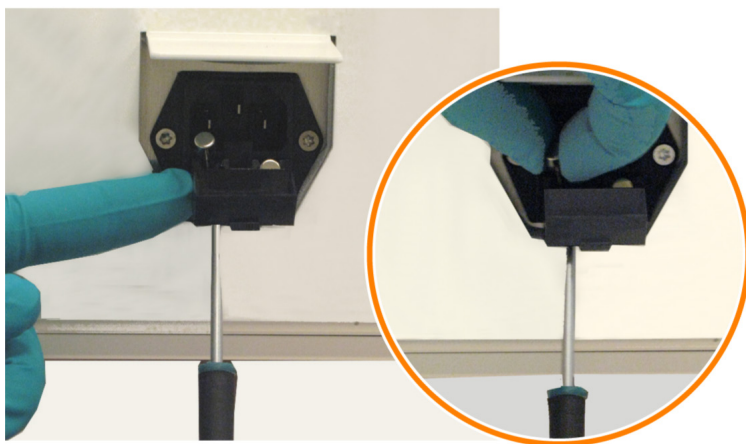


- | | |
|---|--|
| 3 | Fold the drawer lid to locate the mains fuses. |
|---|--|



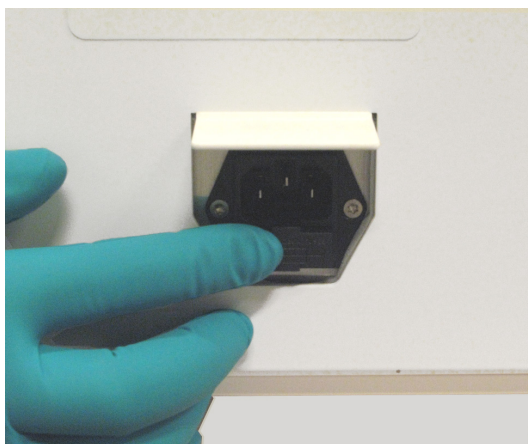
Remove the old fuse with help of a small screwdriver that is inserted in the hole under the fuse drawer.

Step	Action
------	--------



- 4 Insert the new fuses.
For specification of the fuses, see [Electric power, on page 202](#).

- 5 Push the fuse drawer in its holder.



10 Troubleshooting

About this chapter

This chapter provides information for users and service personnel to identify and correct problems that might occur when operating ÄKTA flux s.

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

Precautions



WARNING

Before performing any of the procedures described in this chapter, you must read and understand all contents of the corresponding sections in [Chapter 2 Safety instructions, on page 11](#), as listed below:

- [General precautions, on page 13](#)
- [Personal protection, on page 13](#)
- [Power supply, on page 17](#)
- [Maintenance, on page 19](#)

System

Component	Possible cause	Corrective action
Power	An automatic circuit breaker has triggered	<ul style="list-style-type: none"> Turn off the instrument and visually inspect for damage. If damaged, then contact Cytiva. Check if any of the automatic fuses has popped out. If yes, then push the fuses back.
	A replaceable fuse has gone	<ul style="list-style-type: none"> Check the replaceable fuses in the fuse drawer at the power input. Replace fuse if broken with correct fuse rating see Electric power, on page 202. Turn on the system and if the problem persists, contact Cytiva.
Pumps	Pump not working	<ul style="list-style-type: none"> The Stop button on main screen has been pressed. If problem persists, contact Cytiva.
	Little or no flow	<ul style="list-style-type: none"> Check that connected inlet is actually used. Check if liquid is supplied to the system. Check inlet containers. Check if pressure control valve is open. Check if the tubing from inlet container causes pressure or flow loss. Reasons can be too long tubing, or tubing with too small internal diameter, tubing with a narrow section or that is partly plugged. Peristaltic tubing worn out and flattened or not properly tensioned inside pump head, re-tension or replace tubing inside pump head.
	Too high feed outlet pressure	<ul style="list-style-type: none"> Check the outlet to see if the sensor is not plugged. Filter cassette is plugged with particulates. Replace the filter cassette and filter feed material with 0.2 µm before performing protein concentration.
Peristaltic pumps	Little or no flow due to broken or damaged tubing	<ul style="list-style-type: none"> Check if pressure control valve is open. Check the pump tubing. If problem persists, contact Cytiva.

11 Reference information

About this chapter

This chapter lists the technical specifications of the ÄKTA flux s instrument. The chapter also includes a chemical resistance guide, recycling information, regulatory information and ordering information, and Health and Safety Declaration form for service.

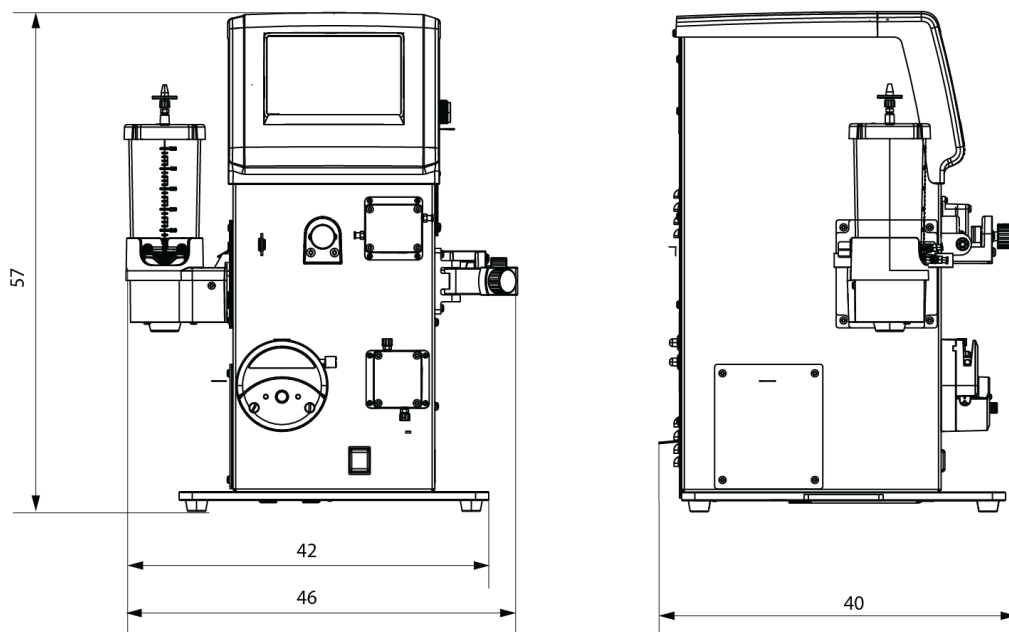
In this chapter

Section		See page
11.1	Specifications	201
11.2	Software license	206
11.3	Wetted materials	207
11.4	Chemical resistance	209
11.5	Recycling information	211
11.6	Regulatory information	212
11.7	Ordering information	225

11.1 Specifications

Dimensions

All dimensions are presented in cm.



Parameter	Specifications
Length (with feed pump)	42 cm
Length (including filter holder)	46 cm
Width (bottom part)	40 cm
Height (including feet)	57 cm

Weight and volume

Parameter	Specification
Weight	28 kg
Tank volume	0.5 L

System sound levels

Parameter	Specification
Max	70 dBA
Typical value under normal running conditions	65 dBA

Electric power

Parameter	Specification
Supply voltage	100-120/220-240 V AC \pm 10%, 50 to 60 Hz
Phases	Single
Max power	300 VA
Ingress protection	IP 21
Fuses	2x T 3.15AL 250 V
Over voltage category	II
Polution degree	2

Operating limits

Parts	Parameter	Specification
Feed pump	Pressure at 20°C	Max 4.0 bar pressure alarm/cut-out
Transfer pump	Feed temperature	2°C to 50°C
	Outlet pressure	Max 1 bar
Permeate pump	Permeate temperature	2°C to 50°C
	Inlet pressure	Max 1 bar
	Outlet pressure	Max 1 bar
Environmental ranges	Ambient temperature	2°C to 35°C
	Temperature, transport	-25°C to +60°C Temperature gradients of $\leq \pm 1^\circ\text{C}/\text{min}$ Dry instrument (drained fluid path)

Parts	Parameter	Specification
	Temperature, storage	-25°C to +50°C Temperature gradients of $\leq \pm 1^\circ\text{C}/\text{min}$ Dry instrument (drained fluid path)
	Air humidity	Max. relative humidity 80% for temperatures up to 31°C, decreasing linearity to 50% relative humidity at 40°C
	Altitude	Max 2000 m
Liquid temperature	Process temperature	2°C to 40°C
	CIP	Max 50°C
Fluid line (tubing and wetted components excl. tank)	Components and piping	-0.4 bar g to 4.0 bar ¹
	Tank	-0.1 bar to 0.05 bar

¹ Pump tubing **PFD** is limited to 2.5 bar.

System capacity

Data	Pump tubing PFB	Pump tubing PFD
Dimensions	3.2 mm ID × 6.4 mm OD	6.4 mm ID × 9.6 mm OD
Length	305 mm	305 mm
Filter inlet pressure	4.0 bar	1.5 bar
Feed flow range	20 to 150 mL/min	20 to 350 mL/min
Transfer flow range	1 to 50 mL/min ¹	1 to 50 mL/min ¹
Permeate flow range	1 to 50 mL/min ¹	1 to 50 mL/min ¹
Transmembrane pressure(TMP) range produced	0.3 to 4.0 bar	0.3 to 2.5 bar
Hold-up volume	10 mL	17 mL
Minimum tank volume (tested)	4.4 mL	4.4 mL
Minimum working volume	15 mL ²	21 mL

¹ To achieve required dynamic ranges, tube size changes may be required, if tube size changes are used, then pump flow will be limited to a given range for a fitted tube size.

² Minimum hold-up volume (excl. filter) with 2 × Tubing 3/32" ID and pump tubing 3.2 mm ID, 55 mm from feed pressure sensor to filter and from filter to retentate pressure sensor, respectively 15 mL.



Longer tubing will be supplied with the instrument, and addition to the 55 mm length used in calculations above will increase the volume accordingly.

Filter and CIP tubing

The following tubing is used for filtration or CIP.

Tag	AXM	AXH	MidGee straight	MidGee hoop	Cassettes	CIP
MF11				x		
MF22				x		
MF32			x	x		
MF41			x			
MF42			x			
MM11		x			x	x
MM12					x	x
MM22		x				
MM32	x	x			x	x
MM42	x					
MM41	x					

Other tubing and accessories

Tag	Part
MM51	Tubing Set 1/16 inch, 600 mm
MF51	Tubing Set 1/16 inch, 600 mm
FF51	Tubing Set 1/16 inch, 600 mm
	Custom male to female luer connection blue × 6
	Gasket × 6
	Tygon tubing 1/16, 50 feet

Filter cassettes

Parameter	Specification
Holder type	Kvick Lab packet Holder
Cassette type and code	Centramate (T01)
Cassette size	0.01 m ²

Parameter	Specification
Number of cassettes	1 to 3
Nut torque	5 Nm (45 in-lb)
Fitting type	Female luer

11.2 Software license

Software components

The product contains the following software components.

Embedded Windows

The license statement can be found from the link below:

<https://www.cytivalifesciences.com/en/us/legal/licensing-statements>

11.3 Wetted materials

Materials used

The materials used in the manufacturing of ÄKTA flux s have been chosen for their biological and chemical compatibility with the solvents used during operation.

List of wetted materials

The table below lists the materials that come into contact with process fluids in ÄKTA flux s.

Designation	Material
EPDM	EthylenePropyleneDiene
Methylpentene copolymer	Methylpentene copolymer
Platinum cured silicone	Platinum cured silicone
PP	PolyPropylene
PTFE	PolyTetraFluoroEthylene
PVDF	PolyVinylDene Fluoride
Silicone	Cured silicone polymer
Tygon	Tygon

Standard components

The table below lists the materials that come into contact with process fluids in ÄKTA flux s.

Component	Materials
Tank assembly	
Tank	PP Methylpentene copolymer
Tank lid	Silicone
Lid seal	PP Methylpentene copolymer
Umbrella check valve/pressure relief valve	EPDM
Mono-mold slim-line stir bar 2" x 5/16" dia	PTFE coated
Male Luer integral lock ring plug	PP

Component	Materials
Male Luer to 1/4-28 bottom sealing thread	PP
Female Luer to 1/4-24 bottom seal	PP
Puradisc™ 25 syringe filter, 0.2 µm	PTFE PP (housing)
Whatman™ filter membrane	PTFE
Pressure sensor	
Front housing	PP
Disposable gasket	Silicone
Female Luer to 1/4-24 bottom seal	PP
Tubing	
Pump tubing	Platinum-cured silicone Expanded PTFE
Line tubing	Tygon
Tubing connectors	PP
Two-way luer lock valve	PP PVDF

11.4 Chemical resistance

Introduction

The tables below list allowed exposure concentrations and times for various chemicals that can be used for ÄKTA flux s.



WARNING

Flammable liquids. ÄKTA flux s is **not approved** to handle flammable liquids.

Allowed chemicals for wetted surfaces

Chemical	Concentration	Max time / cycle	Max acc. expos.	Usage
Acetic acid	25%	3 h	3000 h	CIP
Citric acid	pH 2 to 2.5	1 h at temp ≤ 60°C	1000 h	CIP
Ethanol	20%	12 months	Unlimited	Storage
Ethanol / Acetic acid	20%/10%	3 h	3000 h	CIP
Guanidine hydrochloride	6 M	5 h	5000 h	CIP
Phosphoric acid	5%	Overnight	Unlimited	For SS passivation
2-propanol	30%	1 h	1000 h	CIP
Sodium chloride	0 to 3 M	3 h	3000 h	Purification, CIP
Sodium hydroxide	1 M at pH 14 0.5 M 0.1 M at pH 13	24 h at temp ≤ 40°C 3 h at temp ≤ 50°C 12 months	1000 days 3000 h Unlimited	CIP CIP Storage
Sodium hypochlorite	300 ppm	3 h at temp ≤ 50°C	3000 h	CIP
Sodium hydroxide/ethanol	1 M NaOH and 20% ethanol	3 h	3000 h	CIP

Chemical	Concentration	Max time / cycle	Max acc. expos.	Usage
Urea	8 M	5 h	5000 h	Purification, CIP
Cleaning solutions	1% to 6% STERIS CIP 100, 0.5% Henkel P3-11, 0.2% Micro, 0.2% Tergazyme, 0.1% Tween 80	3 h at temp $\leq 50^{\circ}\text{C}$	3000 h	CIP

Allowed chemicals for outer surfaces

Chemical	Concentration
Acetic acid	25%
Ethanol	70%
Guanidine hydrochloride	6 M
Hydrogen peroxide solution	6%
Minncare cold sterilant solution (fogging)	4,5% per-acetic acid and 22% hydrogen peroxide
Minncare cold sterilant solution (Wiping)	3% Minncare solution
Phosphoric acid	5%
2-propanol	70%
Sodium chloride	0 to 3 M
Sodium hydroxide	1 M at pH 14
Sodium hydroxide	0.5 M
Sodium hypochlorite	300 ppm
Urea	8 M

11.5 Recycling information

Introduction

This section describes the procedures for disposal and recycling of the ÄKTA flux s.



CAUTION

Always use appropriate personal protective equipment when decommissioning the equipment.

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.

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.

11.6 Regulatory information

Introduction

This section lists the regulations and standards that apply to the product. Your product is marked or listed according to the applicable regulatory requirements for your region. Local language translations are only provided according to regulatory requirements.

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11.6.1 Contact information

Introduction

This section shows the contact information for support and manufacturing 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

11.6.2 European Union and European Economic Area

Introduction

This section describes the information that applies to the product in the European Union and European Economic Area.

Conformity with EU Directives

Refer to 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 product 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.

11.6.3 Great Britain

Introduction

This section describes the information that applies to the product in Great Britain.

Conformity with UK Regulations

Refer to the UK Declaration of Conformity for the regulations that apply for the UKCA marking.

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

UKCA marking



The UKCA marking and the corresponding UK Declaration of Conformity are valid for the product 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.

11.6.4 Eurasian Economic Union (Евразийский экономический союз)

This section describes the information that applies to the product in the Eurasian Economic Union.

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 <i>Manufacturing information</i>
Importer and/or company for obtaining information about importer	<p>Cytiva RUS LLC 109004, Moscow internal city area Tagansky municipal district Stanislavsky str., 21, building 5, premises I, offices 24,25,29 Russian Federation Telephone: +7 985 192 75 37 E-mail: rucis@cytiva.com</p>

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
Импортёр и/или лицо для получения информации об импортёре	<p>ООО "Цитива РУС"</p> <p>109004, г. Москва</p> <p>вн. тер. г. муниципальный округ Таганский</p> <p>ул. Станиславского, д. 21 стр. 5, помещ. I, ком. 24,25,29</p> <p>Российская Федерация</p> <p>Телефон: +7 985 192 75 37</p> <p>Адрес электронной почты: rucis@cytiva.com</p>

Description of symbol on the nameplate

Описание символов на заводской табличке



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

11.6.5 North America

Introduction

This section describes the information that applies to the product in the United States of America 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.

11.6.6 China

Introduction

This section describes the information that applies to the product in the People's Republic of China.

有害物质声明 (DoHS)

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，表明本产品在不正常使用的条件下，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。

为保证所声明的环保使用期限，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，以保证所声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 Component 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)
29038437	X	0	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.

11.6.7 South Korea

Introduction

This section describes the information that applies to the product in the Republic of Korea.

Compliance statement



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.



유의사항

A급 기기(업무용 방송통신기자재)

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기

로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

11.6.8 General regulatory statements

Introduction

This section describes the information that is applicable to more than one geographical region.

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.

11.6.9 Other regulations and standards

Introduction

This section describes the additional standards that apply to the product.

Biological and chemical compatibility

The wetted parts of the ÄKTA flux s system meet the material requirements of the following standards and regulations:

Requirement	Description
USP <88> Class VI	USP <88> Biological Reactivity Test In Vivo Class VI.
ADCF	A part is in firsthand animal derived component free (ADCF) or in second hand in compliance with EMA/410/01 or EP chapter 5.2.8 monograph 1483
21 CFR 177	FDA 21 Code of Federal Regulations (CFR) Part 177 Indirect food additives: Polymers.

Regulatory compliance of connected equipment

Any equipment connected to ÄKTA flux s must meet the safety requirements of EN/IEC 61010-1, or relevant harmonized standards. Within the EU, connected equipment must be CE marked.

11.7 Ordering information

For ordering information and latest information on the spare parts and accessories, visit [cytiva.com/aktaflux](https://www.cytiva.com/aktaflux).

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