ÄKTA™ pure is a flexible and intuitive chromatography system (Fig 1) for fast purification of proteins, peptides, and nucleic acids from microgram levels to tens of grams of target product. ÄKTA pure is a reliable system where hardware and UNICORN™ software are designed to work together with columns and chromatography resins to meet purification challenges.

We offer two versions of ÄKTA pure: ÄKTA pure 25, designed for a broad range of research applications and purification tasks in a multiuser environment; and ÄKTA pure 150, which is well-suited for optimizing resource utilization and productivity in routine large-scale preparative purification. The system supports a wide range of chromatography techniques and meets the automation requirements needed to deliver high purity. You can configure the system at any time with a wide range of options to further increase its capabilities depending on your purification needs.

ÄKTA pure 25 M can also be configured for microscale purification, using the Micro kit.

ÄKTA pure is the product of over 50 yr of expertise in protein research and three decades of experience in the development of ÄKTA purification systems.

ÄKTA pure provides you with the following benefits:

- Modular system design with a large range of options to allow flexibility in purification of proteins and peptides
- Intuitive and flexible method creation, system control, and evaluation with UNICORN software
- Practical size, for easy placement on laboratory bench or in cold cabinet
- Reliable system with components and integrated features based on the proven design of ÄKTA protein purification systems
- Predefined method settings for all our laboratory-scale chromatography columns

**System overview**

ÄKTA pure chromatography system is a highly versatile, modular system with a number of design features to facilitate reliable purification.

The system consists of the ÄKTA pure instrument and UNICORN software. The system is modular in design with all valves, monitors, and columns mounted on the forward-facing wet side of the system. The design allows easy interaction with the instrument modules (Fig 2). Additional components such as valves, monitors, and sensors from the wide range of optional modules can easily be added to the available positions. Multiple rails for attachment of column holders and equipment are located at the front and on the side of the instrument. A buffer tray on the top of the instrument provides a large storage area for vessels and bottles. The instrument control panel shows the system state and allows the possibility to interact with the run (pause/continue) at the touch of a button.
Fig 2. Two examples of system configurations for ÄKTA pure showing positions of modules on the front panel and flow paths for each. (A) A basic system configuration for convenient protein purification; (B) System configured for high level of automation.
The system weighs 48 kg in basic configuration and 53 kg when fully equipped with options. The relatively low weight enables easier placement in the laboratory. The system dimensions allow it to fit conveniently into a standard cold cabinet for work with labile samples.

Regardless of configuration, ÄKTA pure always comes with two high-performance system pumps, system pressure monitor for column protection, mixer, injection valve, and UV monitor. ÄKTA pure has a wide range of optional modules to allow a large number of possibilities. The system flow path is designed to minimize band-broadening effects, and all wetted materials used in the flow path are biocompatible and resistant to commonly used solvents. The instrument front is designed with empty module positions where optional valves and monitors can be mounted to enable a flexible configuration of the flow path. Examples of two ÄKTA pure system configurations are shown in Figure 2.

UNICORN software allows a fast and easy start to creating methods, controlling runs, and evaluating results. UNICORN software eliminates the need for programming skills as creation of chromatography methods is done by simple drag-and-drop operations. In addition, the software is modular allowing the addition of features such as Column Logbook and Design of Experiments (DoE) functionality for method development. Licensing options for remote access to the system and/or for creating methods or evaluating results give even greater convenience. If preferred, the system can be set up so that it enters “power save mode” after method end, which enables reduction of power consumption by around 80%.

ÄKTA pure system components and available options are described in the following sections in more detail.

ÄKTA pure standard components

System pump

The two system pumps are based on the technology developed for ÄKTA avant systems. The robust construction delivers reproducible flow rates at both low and high back pressures, allowing short separation times.

Each pump consists of one pair of pump heads, which deliver low-pulsation flow to the mixer. The continuous and accurate flow rates generated enable reproducible isocratic or gradient elution. For ÄKTA pure 25 the system provides a flow rate range of up to 25 mL/min at maximum operating pressure of 200 bar (2900 psi, 20 MPa). For ÄKTA pure 150 the flow rate is up to 150 mL/min at maximum operating pressure of 50 bar (725 psi, 5 MPa). For column packing, ÄKTA pure 25 and 150 can be used at flow rates up to 50 mL/min and 300 mL/min, respectively. A system pressure monitor is connected to the pumps to continuously measure system pressure and enable flow rate to be automatically adjusted to avoid reaching any defined pressure limit.

Mixer

The mixer enables homogeneous buffer composition during gradient runs. The choice of mixer chamber size depends on the flow rate and buffers used. A larger mixer volume is required for higher flow rates or difficult-to-mix buffers. Table 1 shows the mixer chamber sizes available for each instrument.

An in-line filter is mounted inside the mixer. The filter and the mixer are changed by snapping the mixer in or out of the mixer holder. The mixer size used for any given run is always noted in the result file.

Table 1. Available mixer chamber sizes

<table>
<thead>
<tr>
<th>System</th>
<th>Mixer chamber sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ÄKTA pure 25</td>
<td>Included: 1.4 mL; options: 0.6 and 5 mL</td>
</tr>
<tr>
<td>ÄKTA pure 150</td>
<td>Included: 1.4 and 5 mL; option: 15 mL</td>
</tr>
</tbody>
</table>

Injection valve

The injection valve allows for a variety of sample application techniques using sample loops or Superloop™ injection unit. The valve design eliminates the need for replumbing when changing between various sample application techniques. A sample loop with a volume of 500 µL is delivered with the system. Sample loops can be filled manually, via a syringe, or with a sample pump; the same sample application options apply to the use of Superloop unit. Sample loops can also be filled using the system pump.

Moreover, sample can also be applied to the column directly using an optional sample pump or the system pump.

UV monitoring

ÄKTA pure is equipped with either a fixed wavelength UV monitor or a variable multiwavelength UV and visible spectrum monitor.

The fixed wavelength (280 nm) UV monitor U9-L incorporates LED technology, which is durable, reliable, and ready to use at start-up. The design of the UV monitor U9-L prevents heating of the sample. The monitor is available with a 2 mm flow cell as standard (included at delivery) and an optional 5 mm flow cell when higher sensitivity measurements are required. For the U9-L monitor, the lamp operating time is at least 10 000 h.

To determine protein separation at different wavelengths, UV monitor U9-M is designed for multiwavelength detection in the UV and visible spectrum from 190 to 700 nm. UV monitor U9-M allows monitoring of up to three wavelengths simultaneously (Fig 3 and 6). For optimized performance when purifying samples with different protein concentrations, there are three flow cell path lengths available; 0.5, 2 (included at delivery), and 10 mm. The flow cell design, together with fiber optic technology, provides a high signal-to-noise ratio without causing any local heating of the UV flow cell. The monitor contains a high-intensity xenon lamp with an operating time of at least 5000 h and that requires minimal start-up time. Every time the instrument is switched on, the monitor is automatically calibrated. All U9-M UV cells are calibrated at manufacturing. The UV signal is automatically normalized making it possible to compare UV data from different systems.
Monitoring with multiple wavelengths can be used to detect contaminants, specifically labeled proteins, or target molecules that do not absorb light at 280 nm. Figure 3 shows results that demonstrate the possibilities when monitoring with multiple wavelengths. Molecular weight standards were monitored at 214, 280, and 340 nm wavelengths. Detection at 214 nm reveals peptide bonds of all proteins and can be useful if the concentration and extinction coefficient at 280 nm is low for the target protein. Ferritin, a multimeric iron-storage protein, showed stronger absorbance at 340 nm than the other proteins due to the high number of ferric ions in the center of the molecule.

### Conductivity monitor

The conductivity monitor measures conductivity of buffer and samples for online monitoring of the true gradient. An integrated temperature sensor corrects for variations in conductivity due to the temperature. The conductivity monitor has a broad reading range and is therefore able to monitor conductivity in different chromatographic techniques.

---

**Table 1**

<table>
<thead>
<tr>
<th>Column</th>
<th>Superdex™ 200 10/300 GL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td>Molecular weight standards for size exclusion chromatography</td>
</tr>
<tr>
<td>Volume (mL)</td>
<td>100 µL</td>
</tr>
<tr>
<td>Eluent</td>
<td>PBS (10 mM sodium phosphate, 140 mM NaCl, 2.7 mM KCl, pH 7.4)</td>
</tr>
<tr>
<td>Flow rate</td>
<td>0.5 mL/min</td>
</tr>
<tr>
<td>System</td>
<td>ÄKTA pure 25</td>
</tr>
</tbody>
</table>

---

**Fig 3.** Size exclusion chromatography (SEC, also known as gel filtration) with multiwavelength detection (214, 280, and 340 nm) of proteins using ÄKTA pure with UV monitor U9-M. The column used was Superdex 200 10/300 GL. The peaks observed on the chromatogram are (1) ferritin (M_r 44 000), (2) aldolase (M_r 158 000), (3) conalbumin (M_r 75 000), (4) ovalbumin (M_r 44 000), (5) carbonic anhydrase (M_r 29 000), (6) ribonuclease A (M_r 13 700), and (7) aprotinin (M_r 6500).

Both UV monitor U9-L and UV monitor U9-M can be combined with a second UV monitor U9-L to give increased application capabilities such as multistep applications or when using small and large flow cells simultaneously to detect both low and high protein concentrations.

---

**Fig 4.** ÄKTA pure sample pump.

### Buffer selection

ÄKTA pure can be equipped with two different types of inlet valves that allow selection of buffers and wash solutions. Valves with multiple inlets enable cleaning reagents to be permanently on-line, which means that columns and system can be cleaned conveniently at regular intervals.

Inlet selection valve, V9-1AB or V9H-1AB, comprises two A and two B inlet positions in a single valve offering a convenient solution for automation of buffer application and post-run cleaning of columns and system when performing basic chromatography. Any A inlet can be combined with any B inlet to generate gradients. The inlet automation valves A and B provide up to 2 × 7 inlets. Multiple inlets enable automatic screening of buffer and reagent conditions. Each of the inlet automation valves is equipped with an integrated air sensor, which helps in excluding air from the system. If air is detected, the system can be paused so that the air can be purged before it enters the flow path.
Column control

Column valves can be connected to the system and used to control the flow to the column. ÄKTA pure can be equipped with different column valves.

Column control valve, V9-Cs or V9H-Cs, allows connection of one column and has an integrated bypass function, which enables washing of the system without the need to remove the column. The column control valve also allows reverse flow through the column, for fast and effective elution of strongly bound proteins, sharper bands, and a concentrated target molecule eluent.

Column selection valves, V9-C/V9-C2 or V9H-C/V9H-C2, also have the integrated bypass and reverse-flow functions. One or two column selection valves may be connected to the system enabling connection of up to 10 columns for automatic column switching. Connection of multiple columns minimizes manual intervention and reduces further the risk of introducing air into the column.

The column selection valve has two integrated pressure sensors: the first sensor measures pressure before the column, enabling protection of the column hardware while the second measures the pressure after the column. The pressure drop over the column (Δp) is calculated by measuring the difference between the two pressure readings and can be used to protect the packed resin bed (Fig 5).

The flexibility of the column selection valve for connection of up to five columns per valve was demonstrated in a column scouting study using columns for hydrophobic interaction chromatography (HIC). Five columns from HiTrap™ HIC Selection Kit were connected to ÄKTA pure and used for column scouting for E. coli. Column selection valve V9-C allowed the connection of five HiTrap HIC columns to ÄKTA pure for this evaluation. UV monitor U9-M was used for multiwavelength detection. From this scouting, HiTrap Phenyl FF (high sub) 1 mL was selected for use in further scale-up studies.

**Fig 5.** For increased operational safety, the column selection valve enables continuous measurement of precolumn (Pre-CP) and post-column pressure (Post-CP) during runs. The pressure difference over the packed resin bed (Δp) is calculated from the two signals.

**Fig 6.** Column scouting for purification of S-aminotransaminase expressed in E. coli. Column selection valve V9-C allowed the connection of five HiTrap HIC columns to ÄKTA pure for this evaluation. UV monitor U9-M was used for multiwavelength detection. From this scouting, HiTrap Phenyl FF (high sub) 1 mL was selected for use in further scale-up studies.

**pH monitoring**

An optional pH valve with an integrated pH electrode (not included) enables in-line pH monitoring during the run. The pH monitor is easily calibrated by injection of calibration buffer directly into the valve with the pH electrode mounted. A flow restrictor is connected to the pH valve and can be automatically included in the flow path to generate a back pressure that prevents the formation of air bubbles in the UV flow cell. The pH valve is used to direct the flow to the pH electrode and flow restrictor, or alternatively, to bypass one or both. Bypassing the pH electrode means that it can be stored and kept in place on the valve at all times.

**Outlet valves**

Two different valve options are available to direct the flow to the fraction collector, waste, or other outlet ports. Outlet control valve, V9-Os or V9H-Os, allows connection of one or two fraction collectors. If only one is connected, the other port can be used for outlet fractionation, for example to collect flowthrough. Outlet fractionation valve, V9-O or V9H-O, enables connection of up to two fraction collectors, and up to 10 available outlets allow collection of large fractions.
Fraction collection

ÄKTA pure can be equipped with the round fraction collector F9-R (Fig 7) or with the flexible fraction collector F9-C (Fig 8). For reversed phase chromatography applications, use Fraction collector F9-R. Both fraction collectors are controlled through UNICORN software. Fraction collection can be based on time, volume, or automatic peak recognition. Automatic peak recognition minimizes cross-contamination and unwanted eluent can be diverted to the waste. For increased capacity, two units of fraction collector F9-R or one F9-R and one F9-C can be connected together.

DropSync can be used for flow rates up to 2 mL/min. DropSync minimizes spillage by timing fraction changes between drops. At higher flow rates, the accumulator function provides spillage-free fractionation without sample-loss up to 150 mL/min. The system can automatically change between drops. The system can automatically change between the two modes for optimal performance.

Additional module options

ÄKTA pure is a fully modular system that can be further expanded to increase system capability and productivity. Due to the accessibility and design of the modules, they are easily changed, which allows quick and efficient customization.

Versatile valve, V9-V or V9H-V, is a general four-position valve that can be used to tailor the system to specific tasks, for example, for multistep purification schemes. For more information about automated multistep purification, visit cytiva.com/PureAutomation

Up to four versatile valves can be connected to the system. Mixer bypass valve, V9-M or V9H-M, is used for bypassing the mixer if samples are loaded through the system pump. Loop valve, V9-L or V9H-L, allows the use of up to five loops and can be used for collection of intermediate fractions when performing multistep purification or for automated purification of up to five different samples. The loop valve can, for example, also be used for holding reagents or different samples.

Up to two extra eight-position inlet valves can be deployed to expand on buffer and sample inlet capacity. Up to four additional air sensors can be placed in the flow path to enhance security, for example, before the inlet valves or before the column.

I/O-box E9 provides a means of connecting external interfacing equipment such as detectors. I/O-box E9 receives analog or digital signals from, or transfers analog or digital signals to external equipment that needs to be incorporated in the system. Two I/O-box E9 units can be connected to ÄKTA pure.

A list of available additional valves and other options is found in Ordering information.

ÄKTA pure Micro kit for purification in microliter scale

The Micro kit is used to convert the ÄKTA pure 25 M flow path for well optimized microscale purification. The kit enables a flow path with low hold-up volumes and provides a complete solution for small sample volumes and micropreparative columns.

The kit includes 0.6 mL mixer, injection valve, 2 mm UV flow cell, conductivity monitor, and outlet valve. Appropriate tubing and connectors are provided, which help to minimize system volumes and maintain high peak resolution throughout the flow path. An injection fill port is included for best accuracy when injecting small sample volumes using the 10 and 50 µL sample loops provided. The multidirectional column clamp provided allows attachment of the column directly to the UV monitor.

To collect fractions, we recommend the fraction collector F9-R. The Micro kit includes a microfractionation nozzle for fractionation of small droplets and tube holders for Eppendorf™ tubes.

Fig 7. Fraction collector F9-R allows collection in 3, 8, 15, or 50 mL tubes.

Fig 8. Fraction collector F9-C holds cassettes for a variety of tubes from 3 to 50 mL as well as 24-, 48-, and 96-deep-well plates.

The Micro kit includes a microfractionation nozzle for fractionation of small droplets and tube holders for Eppendorf™ tubes.
UNICORN software

UNICORN software gives you real-time control of your chromatography system. UNICORN consists of four modules: **Administration, Method Editor, System Control, and Evaluation.** This section describes some of the valuable tools included in UNICORN for increasing operational security, efficiency, and productivity.

Method Editor

The **Method Editor** module allows you to create or adjust methods to suit your application needs. It contains all the instructions used for controlling the run. The **Method Editor** includes built-in application support for chromatography runs. The interface provides easy viewing and editing of the run parameters. Figure 9 shows a screenshot of the **Method Editor** with customizable panes that provide a comprehensive overview of the run.

The **Method Editor** provides a choice of predefined methods for different chromatography techniques and maintenance procedures. Methods are built using phases. Each phase reflects a step in the run, such as sample application or wash. UNICORN includes a library of predefined phases for creating or editing your own methods. A method is created or edited by dragging-and-dropping phases from the **Phase Library** to the **Method Outline**.

UNICORN includes a library of predefined Cytiva columns. By selecting the column in the **Phase Properties** pane, column parameters (e.g., flow rate and pressure limits) are automatically programmed into the method. For added flexibility, advanced users can edit programming instructions directly in the **Text Instructions** pane.

System Control

The **System Control** module is used to start, view, and control a method run. The module consists of three panes that provide an overview of the status of the run. The **Run Data** pane presents current data in numerical values, while the **Chromatogram** pane illustrates data as curves during the entire method run. The **Process Picture** pane displays the current flow path during the run and can be used to control the run (Fig 10). Color indication incorporated in the process picture shows the current open flow path with flow, closed flow path, or open flow path without flow. Real-time data from monitors are also displayed in the process picture pane.

Column Logbook

To increase operational safety, an optional feature of the software is the **Column Logbook**. The practical tool keeps track of important run data related to individual columns to provide traceability and operational security. Many prepacked columns from Cytiva are barcode-labeled, and individual columns are identified using a 2-D barcode scanner, or the information may be entered manually into UNICORN. UniTag sticker labels, with preprinted barcodes, are available for other columns (e.g., empty columns). By tracking individual columns, information regarding run data such as total number of runs and maximum pressures is recorded for each run. Notification limits can be set, for instance, to define the number of times the column may be run between cleanings, and the user is notified when it is time for column maintenance. The **Column History** function provides a list of all runs that have been performed with a particular column.

In addition to **Column Logbook**, UNICORN offers security by utilizing electronic signatures, password protection, and audit trails. UNICORN is suitable for use in a regulated environment in a manner complying with FDA 21 CFR Part 11. For more detailed information, see UNICORN software data file (29135786).

Design of Experiments (DoE)

UNICORN software has an integrated **Design of Experiments** (DoE) functionality, which can be added as an option. The **DoE** function is a powerful tool for an efficient approach to method optimization. DoE provides an efficient and structured approach where selected parameters are varied simultaneously so that a large data set can be obtained from few experiments (Fig 11). As the **DoE** tool is integrated seamlessly in the UNICORN software, scouting methods are automatically generated from DoE schemes, allowing fast and efficient method optimization.
Prepacked columns complete the package

Cytiva offers an extensive range of prepacked columns for purification, from microgram levels to hundreds of milligrams of target protein and for almost every chromatography technique (Fig 13). The range includes HiTrap, HiPrep™, HiScreen, and HiLoad™ columns for preparative chromatography. Tricorn™ columns are also available for high-resolution semipreparative purifications at microgram scale as well as for protein characterization. In addition to prepacked columns, empty columns for packing with chromatography resins of your choice are available.

Columns for microgram-scale characterization

Tricorn GL and PE columns are high-performance columns prepacked with resins for a variety of chromatography techniques (Fig 13). The column design allows even distribution of liquid eluent over the entire column cross-section, which enables high-resolution purification at micro- and milligram scale. Tricorn GL columns are manufactured in glass to facilitate visual inspection of the resin bed while the tube and filter of PE columns are designed to withstand greater pressure.

Fig 11. The UNICORN DoE tool is an efficient approach to optimization, capturing more information in fewer experiments.

Evaluation

With UNICORN 7, the Evaluation module provides a simplified user interface optimized for most commonly used workflows like quick evaluation, comparison of results, and work with peaks and fractions.

Fig 12. ÄKTA pure accessories include holders and clamps for attaching columns, flasks, and tubing to the system (Fig 12). A selection of tubing kits allow optimization of the flow path for various objectives and connection of any laboratory-scale column from Cytiva.

Fig 13. Columns for use with ÄKTA pure system for different scales of purification. AC = affinity chromatography, DS = desalting, SEC = size exclusion chromatography, IEX = ion-exchange chromatography, HIC = hydrophobic interaction chromatography, RPC = reversed-phase chromatography.

Accessories

ÄKTA pure accessories include column holders and clamps for attaching columns, flasks, and tubing to the system (Fig 12). A selection of tubing kits allow optimization of the flow path for various objectives and connection of any laboratory-scale column from Cytiva.
Columns for milligram-scale purification

HiTrap 1 and 5 mL columns are prepacked with a wide range of resins for purification using various chromatography techniques (Fig 13). The columns can be connected in series for greater capacity. Further scale-up can be achieved with HiPrep 20 mL columns.

RESOURCE™ columns are designed for high-resolution purification of proteins at high flow rates. The columns are prepacked with SOURCE™ resins that have high particle size uniformity and stability to allow high flow rates at low back pressure.

HiScreen columns are prepacked with a wide range of robust BioProcess™ resins to allow repeated use with highly reproducible results. Designed for scalable method optimization, HiScreen columns have a 10 cm bed height and can easily be connected in series to achieve a 20 cm bed height.

HiLoad columns are prepacked glass columns with Superdex prep grade resins designed for high-resolution GF applications.

Pack your own columns for gram-scale purification

The column packing instruction in ÄKTA pure enables convenient column packing at constant pressure and high flow rates. Both A and B pumps are used to generate the flow, making it possible to set flow rate up to 50 mL/min and 300 mL/min for ÄKTA pure 25 and ÄKTA pure 150, respectively.

Several empty column types are available. Which empty column that is best suited will depend upon resin type and running conditions (i.e., flow, pressure etc). HiScale™ empty columns are developed for standard liquid chromatography, optimized for process development and preparative protein purification. The columns are designed to withstand high pressures and high flow rates making them compatible with BioProcess chromatography resins such as MabSelect™ and Capto™ resins.

XK columns are user-friendly and robust columns for standard protein purification. The columns are designed for liquid chromatography at low to medium pressure.

System specifications

<table>
<thead>
<tr>
<th>Control system</th>
<th>UNICORN, version 6.3 or later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W × H × D)</td>
<td>535 × 630 × 470 mm</td>
</tr>
<tr>
<td>Weight (excluding computer, sample pump, fraction collector)</td>
<td>Up to 53 kg</td>
</tr>
<tr>
<td>Power supply</td>
<td>100–240 V, ~50–60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>300 VA (typical), 25 VA (power-save)</td>
</tr>
<tr>
<td>Enclosure protective class</td>
<td>IP 21</td>
</tr>
</tbody>
</table>

Flow rate specifications

| Flow rate specifications | ÄKTA pure 25:  
|                         | Accuracy: ± 1.2%  
|                         | Precision: RSD < 0.5% (conditions: 0.25 to 25 mL/min, < 3 MPa, 0.8 to 2 cP)  
|                         | ÄKTA pure 150:  
|                         | Accuracy: ± 1.5%  
|                         | Precision: RSD < 0.5% (conditions: 1.0 to 150 mL/min, < 3 MPa, 0.8 to 2 cP)  |

Pressure range

| Pressure range | ÄKTA pure 25: 0 to 20 MPa  
|               | ÄKTA pure 150: 0 to 5 MPa   |

Viscosity range

| Viscosity range | ÄKTA pure 25: 0.35 to 10 cP (5 cP above 12.5 mL/min)  
|                | ÄKTA pure 150: 0.35 to 5 cP                     |

Sample pump

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Piston pump, metering type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W × H × D)</td>
<td>215 × 210 × 370 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>11 kg</td>
</tr>
</tbody>
</table>
| Flow rate setting
| ÄKTA pure 25: 0.001 to 50 mL/min  
| ÄKTA pure 150: 0.01 to 150 mL/min |

Flow rate specifications

| Flow rate specifications | ÄKTA pure 25:  
|                         | Accuracy: ± 2%  
|                         | Precision: RSD < 0.5% (conditions: 0.25 to 50 mL/min, < 3 MPa, < 3 cP)  
|                         | ÄKTA pure 150:  
|                         | Accuracy: ± 2%  
|                         | Precision: RSD < 0.5% (conditions: 1.0 to 150 mL/min, < 3 MPa, < 3 cP)  |

Pressure range

| Pressure range | ÄKTA pure 25: 0 to 10 MPa  
|               | ÄKTA pure 150: 0 to 5 MPa   |

Viscosity range

| Viscosity range | 0.7 to 10 cP                              |

Mixer

| Mixing principle | Chamber with a magnetic stirrer          |
| Mixer volume     | ÄKTA pure 25: 0.6, 1.4 (mounted on system), 5 mL  
|                  | ÄKTA pure 150: 1.4 (mounted on system), 5 mL (included with system), or 15 mL |

Gradient flow rate range

| Gradient flow rate range | ÄKTA pure 25: 0.1 to 25 mL/min  
|                         | ÄKTA pure 150: 0.5 to 150 mL/min |

Gradient composition accuracy

| Gradient composition accuracy | ÄKTA pure 25: ± 0.6% (conditions: 5 to 95% B, 0.6 to 25 mL/min, 0.2 to 2 MPa, 0.8 to 3 cP)  
|                              | ÄKTA pure 150: ± 0.8% (conditions: 5 to 95% B, 2 to 150 mL/min, 0.2 to 2 MPa, 0.8 to 3 cP) |

Valves

<table>
<thead>
<tr>
<th>Type</th>
<th>Rotary valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of valves</td>
<td>Up to 12</td>
</tr>
</tbody>
</table>
| Functions        | Standard: injection valve  
|                  | Options: inlet selection, mixer-by-pass, loop selection, column selection, pH, outlet, versatile |

Optional valves*

<table>
<thead>
<tr>
<th>Optional valves*</th>
<th>Up to three additional modules can be installed outside the systems chassis.</th>
</tr>
</thead>
</table>

Pressure sensors

| Placement of sensors | Standard: after system pump  
|                     | Options: after sample pump, pre-column, post-column                      |
| Range               | 0 to 20 MPa                                                             |
| Accuracy            | ± 0.02 MPa or ± 2%, whichever is greater                                 |
**Module options**

### Inlet valves
- **Inlet A**: 1, 2, or 7 inlets
- **Inlet B**: 1, 2, or 7 inlets
- **Sample inlet**: 0, 1, or 7 inlets
- **Additional inlets**: Up to 16

### UV monitors

<table>
<thead>
<tr>
<th>UV monitor U9-L</th>
<th>UV monitor U9-M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wavelength range</strong></td>
<td>280 nm</td>
</tr>
<tr>
<td><strong>Flow cells</strong></td>
<td>Standard: Optical path length 2 mm</td>
</tr>
<tr>
<td></td>
<td>Cell volume 2 μL</td>
</tr>
<tr>
<td></td>
<td>Options: Optical path length 10 mm</td>
</tr>
<tr>
<td></td>
<td>Cell volume 8 μL</td>
</tr>
<tr>
<td></td>
<td>Optical path length 0.5 mm</td>
</tr>
<tr>
<td></td>
<td>Cell volume 1 μL</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>0.001 mAU</td>
</tr>
<tr>
<td><strong>Linearity</strong></td>
<td>± 5% within 0–2 AU</td>
</tr>
<tr>
<td><strong>Drift</strong></td>
<td>≤ 0.2 mA/U; AU/h, 2 mm cell</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>&lt; 0.1 mAU</td>
</tr>
<tr>
<td><strong>Lamp operating time</strong></td>
<td>&gt; 10,000 h</td>
</tr>
</tbody>
</table>

### Conductivity monitor, C9n
- **Conductivity reading range**: 0.01 mS/cm to 999.99 mS/cm
- **Accuracy**: ± 0.01 mS/cm or ± 2%, whichever is greater (within 0.3 to 300 mS/cm)
- **Operating pressure**: 0 to 5 MPa
- **Flow cell volume**: 22 μL
- **Temperature monitor range**: 0°C to 99°C
- **Temperature monitor accuracy**: ± 1.5°C within 4°C to 45°C

### Temperature monitor
- **Reading range**: 0°C to 99°C
- **Accuracy**: ± 1.5°C within 4°C and 45°C

### pH monitor, V9-pH
- **pH reading range**: 0 to 14
- **Accuracy**: ± 0.1 pH unit within pH 2 to 12
- **Operating pressure**: 0 to 0.5 MPa
- **Flow cell volume**: ÅKTA pure 25: 76 μL ÅKTA pure 150: 129 μL

### Round fraction collector, F9-R*
- **Number of F9-R**: Up to 2 (two Round fraction collector F9-R or one F9-R and one Flexible fraction collector, F9-C)
- **Number of fractions**: Up to 175 per fraction collector
- **Vessels**: 175 (3 mL tubes) 85 (8 or 15 mL tubes) 40 (50 mL tubes)
- **Fraction volumes**: 0.1 to 50 mL
- **Spillage-free mode**: DropSync
- **Flammable liquids**: Yes
- **Dimensions (W × H × D)**: 320 × 250 × 400 mm
- **Weight**: 5 kg

### Delay volume
- **(UV – dispenser head)**: ÅKTA pure 25: 205 μL (86 μL with optional tubing kit, i.d. 0.25 mm) ÅKTA pure 150: 473 μL (278 μL with optional tubing kit, i.d. 0.5 mm) ÅKTA pure 25 M with Micro kit: 18 μL (with red tubing kit, i.d. 0.13 mm)

### Flexible fraction collector, F9-C*
- **Number of F9-C**: 1 (if needed add one Round fraction collector, F9-R)
- **Number of fractions**: Up to 576
- **Number of cassettes**: 6
- **Number of cassette trays**: 1

#### Vessel types
- Tubes per cassette:
  - 40 (3 mL tubes, total per tray 240)
  - 24 (8 mL tubes, total per tray 144)
  - 15 (15 mL tubes, total per tray 90)
- Plates per cassette:
  - 5 (50 mL tubes, total per tray 36)
  - 1 deep-well plate (24, 48 or 96 wells), 6 plates per tray
  - Bottles per cassette tray:
    - 55 (50 mL bottles of squared shape), 18 (250 mL bottles of squared shape)

### Outlet valves
- **Number of outlets**: Valve V9-Os or V9H-Os: 3 (waste, fraction collector, 1 outlet position) Valve V9-O or V9H-O: 12 (waste, fraction collector, 10 outlet positions)
- **Delay volume**: ÅKTA pure 25: 435 μL (214 μL with optional tubing kit, i.d. 0.25 mm) ÅKTA pure 150: 876 μL (508 μL with optional tubing kit, i.d. 0.5 mm)

### Air sensors
- **Number of sensors**: Up to 7
- **Placement of built-in sensors**: Inlet valve V9-IA, Inlet valve V9-IB, Sample inlet valve V9-IS
- **Placement of additional sensors**: After the injection valve sensors Before the system pumps

### Sensing principle
- Ultrasonic

### I/O-box E9
- **Number of I/O boxes**: 2
- **Number of ports per box**: 2 analog in, 2 analog out 4 digital in, 4 digital out
- **Analog range**: In ± 2 V Out ± 1 V

---

*Application supported: affinity chromatography, size exclusion chromatography (gel filtration), ion exchange chromatography, hydrophobic interaction chromatography, and reversed phase chromatography.

† The delay volume will change if a different tubing length between the system and the fraction collector is used.

‡ Application supported: affinity chromatography, size exclusion chromatography (gel filtration), ion exchange chromatography, and hydrophobic interaction chromatography.

§ The fraction collector can hold either up to six cassettes or one cassette tray.
Ordering information

**Product** | **Product code**
---|---
ÄKTA pure 25 L | 29018224
ÄKTA pure 25 M | 29018226
ÄKTA pure 25 L1 (V9-IAB, V9-Os) | 29018225
ÄKTA pure 25 M1 (V9-IAB, V9-Os) | 29018227
ÄKTA pure 150 L | 29046665
ÄKTA pure 150 M | 29046694
ÄKTA pure 150 M3 (V9H-IA, V9H-C, V9H-O) | 29046697
ÄKTA pure User Manual, printed copy (digital included) | 29282726
Micro kit for ÄKTA pure 25 M | 29302910
UNICORN 7 Workstation license | 29128116
UNICORN 7 remote license without DVD | 29115426
UNICORN 7 dry license without DVD | 29115427
UNICORN 7 DoE concurrent license | 29046797
UNICORN 7 Evaluation Classic | 29115456
UNICORN 7 Column Logbook lic | 29115441
UNICORN 7 manual package | 29127795

**System modules and accessories**

**Mixer**
- Mixer chamber 0.6 mL | 28956186
- Mixer chamber 1.4 mL (incl. with all systems) | 28956225
- Mixer chamber 5 mL (incl. with ÄKTA pure 150) | 28956246
- Mixer chamber 15 mL | 28980309
- Online filter kit | 18102771
- O-ring 13.1 × 1.6 mm, high resistance | 29011326
- O-ring 13.1 × 1.6 mm (for Mixer chamber 0.6, 1.5 and 5 mL) | 28953545
- O-ring 22.1 × 1.6 mm (for Mixer chamber 15 mL) | 28981857

**Valves***

<table>
<thead>
<tr>
<th>*</th>
<th>ÄKTA pure 25</th>
<th>ÄKTA pure 150</th>
</tr>
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<tbody>
<tr>
<td>Sample inlet valve kit</td>
<td>(V9-IS) 29027746</td>
<td>(V9H-IS) 29050943</td>
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<tr>
<td>Inlet valve kit A</td>
<td>(V9-IA) 29012263</td>
<td>(V9H-IA) 29050945</td>
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<tr>
<td>Inlet valve kit B</td>
<td>(V9-IB) 29012370</td>
<td>(V9H-IB) 29050946</td>
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<tr>
<td>Inlet valve kit AB</td>
<td>(V9-IAB) 29011357</td>
<td>(V9H-IAB) 29089652</td>
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<td>Inlet valve X1</td>
<td>(V9-X1) 28957227</td>
<td>(V9H-X1) 28979326</td>
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<td>Inlet valve X2</td>
<td>(V9-X2) 28957234</td>
<td>(V9H-X2) 28979328</td>
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<td>Mixer valve kit</td>
<td>(V9-M) 29011354</td>
<td>(V9H-M) 29090692</td>
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<tr>
<td>Loop valve kit</td>
<td>(V9-L) 29011358</td>
<td>(V9H-L) 29090689</td>
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<tr>
<td>Column valve</td>
<td>(V9-Cs) 29011355</td>
<td>(V9H-Cs) 29090693</td>
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<tr>
<td>Column selection valve</td>
<td>(V9-C) 29011367</td>
<td>(V9H-C) 29050951</td>
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<td>Column selection valve, second</td>
<td>(V9-C2) 28957236</td>
<td>(V9H-C2) 28979330</td>
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<tr>
<td>pH valve kit</td>
<td>(V9-pH) 29011359</td>
<td>(V9H-pH) 29051684</td>
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<tr>
<td>Versatile valve</td>
<td>(V9-V) 29011356</td>
<td>(V9H-V) 29090691</td>
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<tr>
<td>Outlet valve kit (10 outlets)</td>
<td>(V9-O) 29012261</td>
<td>(V9H-O) 29050949</td>
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<tr>
<td>Outlet valve kit (1 outlet)</td>
<td>(V9-Os) 29011356</td>
<td>(V9H-Os) 29090694</td>
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**UV monitor**

<table>
<thead>
<tr>
<th>Product code</th>
<th>Product code</th>
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<tbody>
<tr>
<td>Second UV monitor U9-L†</td>
<td>29011360</td>
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<tr>
<td>UV flow cell U9-0.5, 0.5 mm for U9-M</td>
<td>28979386</td>
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<tr>
<td>UV flow cell U9-2, 2 mm for U9-M (incl. in system with U9-M)</td>
<td>28979380</td>
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<tr>
<td>UV flow cell U9-10, 10 mm for U9-M</td>
<td>28965378</td>
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<tr>
<td>UV flow cell 2 mm for U9-L (incl. with first UV monitor U9-L)</td>
<td>29011325</td>
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<tr>
<td>UV flow cell 5 mm for U9-L</td>
<td>18112824</td>
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</tbody>
</table>

**Sample pump**

- Sample pump S9 | 29027745
- Sample pump S9H | 29050593

**pH and conductivity monitors**

- pH electrode | 28954215
- O-ring 5.3 × 2.4 mm (for pH electrode) | 28956497
- Conductivity monitor C9 | 29011363

**Injection valve accessories**

- Sample loop 10 μL | 18112039
- Sample loop 100 μL | 18111398
- Sample loop 500 μL (incl. with all systems) | 18111399
- Sample loop 1 mL | 18111401
- Sample loop 2 mL | 18111402
- Sample loop 10 mL | 18111624
- Superloop 10 mL | 19758501
- Superloop 50 mL | 18111382
- Superloop 150 mL | 18102385

**Fraction collector F9-R**

- Fraction collector F9-R | 29011362
- Tube rack with 175 positions for 12 mm vials, bowl, tube support, holder and guide | 19868403
- Tube rack with, 95 positions for 10–18 mm vials | 18305003
- Tube rack with 40 positions for 30 mm vials, bowl, tube support, holder and guide | 18112467

**Fraction collector F9-C**

- Fraction collector F9-C | 29027743
- Cassette tray, holds up to six cassettes | 28954209
- Cassette, holds 6 × 50 mL tubes (2-pack) | 28956402
- Cassette, holds 15 × 15 mL tubes (2-pack) | 28956404
- Cassette, holds 24 × 8 mL tubes (2-pack) | 28956425
- Cassette, holds 40 × 3 mL tubes (2-pack) | 28956427
- Cassette, holds 40 × 5 mL tubes (2-pack) | 29133422
- Cassette, holds 96-, 48-, or 24- deep-well plate (2-pack) | 28954212
- Rack, holds 55 × 50 mL bottles | 28980319
- Rack, holds 18 × 250 mL bottles | 28981873

* The valves for ÄKTA pure 25 and ÄKTA pure 150 are compatible with both systems but for optimal performance, the specific valve type should be used.
† For Second UV monitor U9-L, flow cells are ordered on separate Product code.
‡ Automatically detects and prevents air from entering columns. Can be attached to system using adapter for air sensor and bottle holder. Uses 1/16 inch connectors.
§ Automatically detects air in inlet tubing, for example, to pause system if running out of buffer or for complete loading of sample. Can be attached to system using adapter for air sensor and bottle holder. Uses 1/8 inch connectors.
### Additional air sensors
- Air sensor L9-1.2 mm
- Air sensor L9-1.5 mm
- Adapter for air sensor

### Miscellaneous
- I/O-box E9
- Real-time unit

### Barcode labels and scanner
- UniTag (1 sheet with 108 labels)
- Barcode scanner 2-D with USB

### Tubing kits

<table>
<thead>
<tr>
<th>Product code</th>
<th>Akta pure 25</th>
<th>Akta pure 150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tubing kit i.d. 0.25 mm</td>
<td>29011328</td>
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<tr>
<td>Tubing kit i.d. 0.5 mm (std. Akta pure 25)</td>
<td>29011327</td>
<td>29051669</td>
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<tr>
<td>Tubing kit i.d. 0.75 mm (std. Akta pure 150)</td>
<td>29011329</td>
<td>29048242</td>
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<tr>
<td>Tubing kit i.d. 1.0 mm (incl. Akta pure 150)</td>
<td>29032426</td>
<td>29032426</td>
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<tr>
<td>Tubing kit for sample inlet valve (7 inlets)</td>
<td>29035331</td>
<td>29051666</td>
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<tr>
<td>Sample tubing kit for 7 inlets, i.d. 0.75 mm</td>
<td>28957217</td>
<td>28957217</td>
</tr>
<tr>
<td>Inlet tubing kit for inlet valve IAB</td>
<td>29011330</td>
<td>290106497</td>
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<tr>
<td>Tubing kit for pH valve, standard</td>
<td>29011331</td>
<td>29051674</td>
</tr>
<tr>
<td>Tubing kit for inlet valve A (7 ports)</td>
<td>29011332</td>
<td>29051197</td>
</tr>
<tr>
<td>Tubing kit for inlet valve B (7 ports)</td>
<td>29011333</td>
<td>29051189</td>
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<tr>
<td>Tubing kit for outlet fractionation (10 outlets)</td>
<td>29011334</td>
<td>29048611</td>
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<tr>
<td>System and sample pump rinse tubing kit</td>
<td>29011348</td>
<td>29011348</td>
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<tr>
<td>Peak collect tubing</td>
<td>29314678</td>
<td>29315061</td>
</tr>
</tbody>
</table>

### Cables
- Jumper D-SUB
- Jumper 1 IEC 1394 (F-type)
- External module cable, short
- External module cable, long
- 2.5 m cable for F9-C or S9 (UniNet-9 D-type)

### Holders
- Column holder rod
- Tubing holder spool, for small tubing (o.d. 1/8” and smaller)
- Tubing holder spool, for large inlet tubing (o.d. 3/16”)
- Column and bottle holder o.d. 10–50 mm
- Tubing holder comb
- Flexible column holder for HiScreen columns
- Inlet filter holder kit, ÄKTA
- Column clamp o.d. 10–21 mm
- Multidirectional column clamp
- Adapter for air sensor
- Bottle and airsensor holder
- Tube holder (5-pack)
- Multipurpose holder
- Rail extension
- Loop holder with 5 x 10 mL sample loops
- Screw lid kit, ÄKTA
- Extension box

* To use as an airsensor holder the adapter 28956342 is also needed.

### Related literature

<table>
<thead>
<tr>
<th>Product code</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNICORN 7 software, Data file</td>
</tr>
<tr>
<td>Purification of a miniature recombinant spidroin protein expressed in E. coli using Akta pure system, Application note</td>
</tr>
<tr>
<td>Purification and immobilization of a transaminase for the preparation of an enzyme bioreactor, Application note</td>
</tr>
<tr>
<td>Prepacked chromatography columns for Akta systems, Selection guide</td>
</tr>
<tr>
<td>Micro kit for Akta pure 25, Instructions for use</td>
</tr>
<tr>
<td>Connect Alias™ autosampler to Akta pure, Instructions for use</td>
</tr>
<tr>
<td>Akta laboratory-scale chromatography systems, Instrument management, Handbook</td>
</tr>
<tr>
<td>Design of experiments (DoE) in protein production and purification, Handbook</td>
</tr>
<tr>
<td>Good Akta system practice, Cue card</td>
</tr>
</tbody>
</table>

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