

ÄKTA pilot™ 600S

Product Documentation

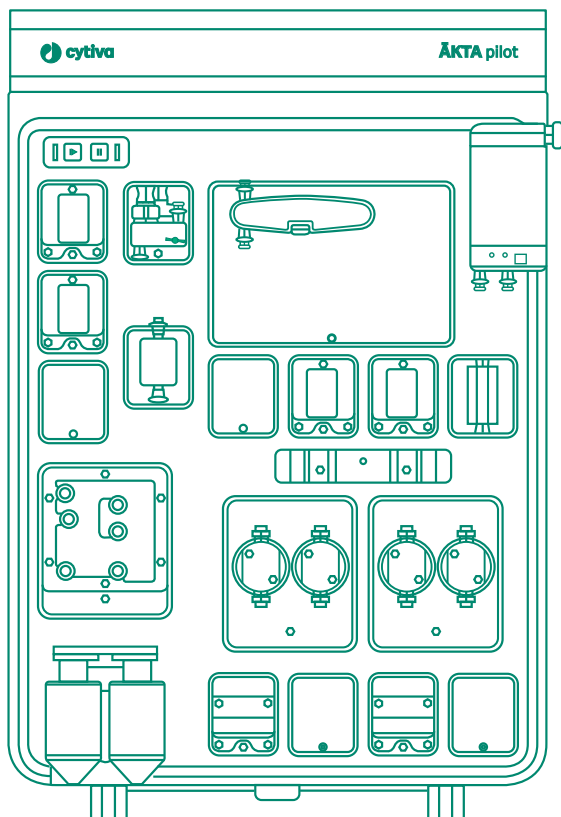


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1 Introduction

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1.1 About this manual

Purpose of this document

This document provides an overview of ÄKTA pilot™ 600S instrument, general specifications and information about material conformity. For more information about ÄKTA pilot 600S instrument, refer to the user documentation.

Scope of this document

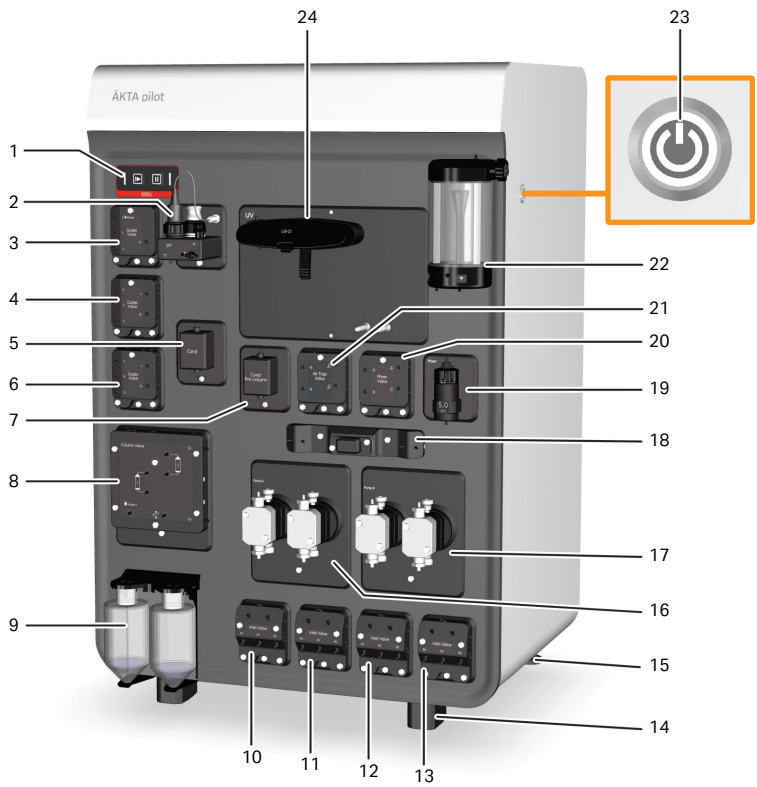
The *Product Documentation* covers the ÄKTA pilot 600S instrument, and available modules.

Note: *All pressure values are reported as pressure relative to ambient atmospheric pressure, i.e., gauge pressure, unless stated otherwise.*

1.2 Instrument overview

Illustration of the ÄKTA pilot 600S instrument

The following illustration shows an example of the ÄKTA pilot 600S instrument, with all modules installed. The location of modules can vary, depending on customer requirements. The table below indicates if a module type is optional.



Part	Description	Label	Optional (*)
1	Control panel. The instrument version is indicated below the control panel: 600S (red) or 600R (blue)	-	
2	pH monitor	pH	*

Part	Description	Label	Optional (*)
3	Outlet valve 1-3, port 1 can be used for waste	Outlet Valve 1-Waste 2 3	
4	Outlet valve 4-6	Outlet Valve 4 5 6	*
5	Conductivity monitor	Cond	
6	Outlet valve 7-9	Outlet Valve 7 8 9	*
7	Pre-column Conductivity monitor	Cond Pre-column	*
8	Column valve, including pre- and post-column pressure sensor	Column Valve	
9	Bottles for pump rinsing solution (250 mL centrifuge tubes)	-	
10	Inlet valve A1-A3	Inlet Valve A1 A2 A3	
11	Inlet valve A4-A6	Inlet Valve A4 A5 A6	*
12	Inlet valve B1-B3	Inlet Valve B1 B2 B3	
13	Inlet valve B4-B6	Inlet Valve B4 B5 B6	*
14	Fixed plastic feet	-	
15	Adjustable feet	-	
16	System pump A	Pump A	
17	System pump B	Pump B	
18	Flow restrictor, including system pressure sensor	-	
19	Mixer module with 5 mL mixer chamber	Mixer	*
20	Mixer valve	Mixer Valve	*
21	Air trap valve, including air sensor	Air Trap Valve	

Part	Description	Label	Optional (*)
22	Air trap	-	
23	ON/OFF button	-	
24	UV monitor	UV	

External air sensors (optional)

Up to four air sensors can be installed between the buffer or sample containers and the inlet valves. The external air sensors can be used to detect empty containers and to change inlet ports, for continued supply of sample or buffer, or to pause the run.

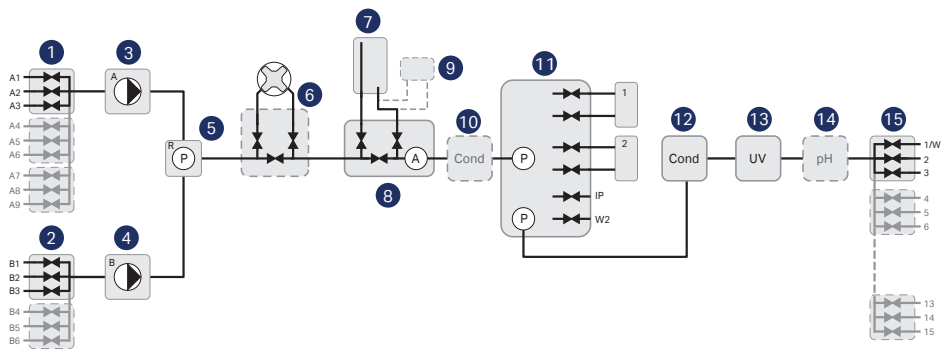
I/O-box (optional)

The external I/O-box can be used to connect other equipment in order to measure parameters such as refractive index, light scattering and fluorescence. The I/O-box can communicate with external equipment by digital or analog signals.

1.3 Liquid flow path

Flow diagram

The following illustration shows a schematic diagram of the flow path. Optional components are marked with dashed outlines.

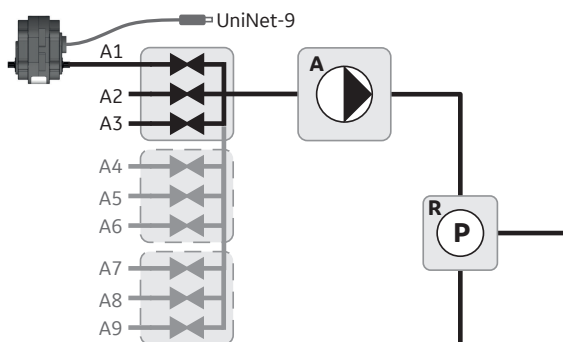


Part	Function
1	Inlet valve A with 3 ports that can be expanded to 9 ports with optional inlet valves.
2	Inlet valve B with 3 ports that can be expanded to 6 ports with optional inlet valves.
3	System pump A
4	System pump B
5	Flow restrictor and system pressure sensor
6	Mixer and mixer valve (optional)
7	Air trap
8	Air trap valve including air sensor
9	In-line filter (optional)
10	Pre-column conductivity monitor with temperature sensor (optional)
11	Column valve including pre-column and post-column pressure sensors
12	Conductivity monitor with temperature sensor

Part	Function
13	UV monitor
14	pH module (optional)
15	Outlet valve with 3 ports that can be expanded to 15 ports with optional outlet valves.

Adding external air sensors to the flow path

External air sensors can be added before the A or B inlets, as shown in the following flow diagram.



2 General specifications

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2.1 Instrument specifications

Technical specifications

Parameter	Data
System configuration	Benchtop instrument, external computer
Control system	UNICORN™ 7.3 or later version
Connection between PC and instrument	Ethernet
Dimensions (width × height × depth)	58 × 86 × 52 cm
Weight (excluding computer, columns, buffer bottles)	78 to 84 kg ¹
Power supply	100 to 240 V~ autorange
Maximum voltage fluctuation	± 10% from the nominal voltage
Frequency	50/60 Hz
Power consumption	800 VA
Power supply cord	2 m
Fuse rating	T8AL 250 V
Inlet feed pressure	-0.1 bar ≤ inlet pressure < 0.1 bar
Outlet feed pressure	0 bar ≤ outlet pressure < 1 bar
Enclosure protective class, ÄKTA pilot 600S instrument	IP 23

¹ Depending on configuration.

Instrument configuration

Parameter	Data
System model	ÄKTA pilot 600S
Number of pumps	2
Gradient function	Yes, binary
Pressure flow control	Yes
Number of inlets, pump A	3 inlets Optional: One or two additional inlet valves, giving a total of 6 or 9 inlets
Number of inlets, pump B	3 inlets Optional: One additional inlet valve, giving a total of 6 inlets
System pressure monitoring	Yes
Mixer and mixer valve	Optional
Air trap and air trap valve	Yes
Filter	Optional: - Stainless steel housing, max 20 bar - Capsule filter mouting kit, max 5 bar
Air detection (pre-column)	Yes, on outlet from air trap valve
Conductivity and temperature monitoring (pre-column)	Optional: Pre-column conductivity and temperature monitor
Pressure monitoring (pre-column)	Yes
Column connections	2
Intelligent packing	Yes
Pressure monitoring (post-column)	Yes
Conductivity monitoring (post-column)	Yes
Temp monitoring (post-column)	Yes
UV monitoring	3 variable wavelengths
UV cell path lenght	2 mm or 5 mm
pH monitoring	Optional

Parameter	Data
Number of outlets	3 outlets Optional: Up to four additional outlet valves, giving a total of 6, 9, 12 or 15 outlets
I/O-boxes	Optional: Up to two I/O-boxes can be used

2.2 Environmental requirements

Environmental requirements

The installation site must comply with the following specifications.

Parameter	Requirement
Allowed location	Indoor use only
Ambient temperature, operating	4°C to 35°C
Ambient temperature, storage	-25°C to 60°C
Relative humidity, operating	20% to 95%, non-condensing
Relative humidity, non-operating	20% to 95%, non-condensing
Altitude, operating	Up to 2000 m ¹
Pollution degree of the intended environment	Pollution degree 2

¹ If the installation site is situated at a higher altitude, the customer is responsible for establishing that the ÅKTA pilot 600S instrument can be used safely in accordance with local regulations.

2.3 Module specifications

Air sensors

Item	Description
Location of integrated air sensor	Air trap valve, installed at the outlet of the valve
Optional external air sensors	Up to 4 air sensors, installed before inlet valves
Sensing principle	Ultrasonic

Instrument pumps

Parameter	Data
Pump type	Piston pump, metering type
Flow rate	0.1 to 600 mL/min (normal range) 600 to 1200 mL/min (combined flow from both pumps)
Max. operating pressure	2 MPa (20 bar g)
Viscosity range	0.7 to 5 cP
Flow rate specifications	Accuracy: $\pm 2\%$ (Condition: 2.0 to 600 mL/min, up to 1200 with dual flow)

Gradient performance

Parameter	Data
Gradient flow rate range	4 to 600 mL/min
Gradient range	0 to 100 %B
Gradient composition accuracy	$\pm 1\%$ B within range 1 to 99 %B (Condition: flow rate 5 to 600 mL/min, room temperature (20°C to 25°C), pressure 0.2 to 1 MPa (2 to 10 bar g))

Mixer

Item	Description
Mixing principle	Chamber with a magnetic stirrer
Mixer volume	5 mL

Conductivity monitor

Item	Description
Number of monitors	Up to 2 (pre-column, post-column)
Conductivity reading range	0.01 to 999.99 mS/cm
Accuracy	± 0.10 mS/cm or $\pm 3\%$, whichever is greater (within 0.3 to 300 mS/cm)

Pressure monitors

Item	Description
Number of sensors	3
Location	Flow restrictor, integrated in column valve (pre-column and post-column)
Pressure range	0 to 2 MPa (0 to 20 bar)
Accuracy	± 0.012 MPa (0.12 bar) or $\pm 2\%$, whichever is greater

Temperature monitors

Item	Description
Location	Integrated in Conductivity monitors
Reading range	2°C to 70°C
Accuracy	$\pm 2^\circ\text{C}$ within 4°C to 35°C

UV monitor

Item	Description
Wavelength range	190 to 700 nm steps of 1 nm, up to 3 wavelengths
Absorbance range	-6 to 6 AU
Linearity	within $\pm 2\%$ within 0 to 2 AU
Lamp operating time	> 5000 hours
Flow cells	Standard: Optical path length 2 mm Option: Optical path length 5 mm

pH monitor

Item	Description
pH reading range	0 to 14
Accuracy	± 0.15 pH unit (within pH 2 to 12, temp. within 2°C from calibration temp.)
Operating pressure	0 to 0.5 MPa

I/O box

Parameter	Data
Number of ports	2 analog in, 2 analog out 4 digital in, 4 digital out
Analog range	In ± 2 V Out ± 1 V
Enclosure protective class	IP 22 ¹

¹ The I/O-box E9 has protection class IP22 when mounted on the Extension stand. In all other locations, the protection class is IP20.

3 Material conformity

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3.1 Material definitions

Introduction

The table below lists the designation of materials that are used for parts in contact with the process fluids, and/or parts that are pressure retaining.

Material list

Designation	Material
Al ₂ O ₃	Aluminum oxide
ASTM 316L	Stainless Steel: EN 1.4404, EN 1.4432 or EN 1.4435, or combinations of those
Elgiloy	Non-magnetic Cobalt-Chromium-Nickel-Molybdenum Elgiloy
EPDM	EthylenePropyleneDiene Monomer (M-class)
FEP	FluorinatedEthylenePropylene
FFPM/FFKM	FullFluorinatedPropyleneMonomer
FPM/FKM	Fluorinated Propylene Monomer
Glass	Borosilicate, Suprasil or Quartz glass
PCTFE	PolyChloroTriFluoroEthylene
PEEK	PolyEtherEtherKetone
PTFE	PolyTetraFluoroEthylene
PVDF	PolyVinylideneDiFluoride
Ruby	-
Titanium	Titanium Grade unknown
Titanium Gr. 2	Titanium Grade 2
UHMWPE	UltraHighMolecularWeightPolyEthylene
ZrO ₂	Zirconium dioxide (ceramic)

3.2 Materials of construction

Introduction

The tables in this section list the materials used in the tubing and the materials used in parts in contact with the process fluids, and/or parts that are pressure retaining.

Tubing

Parameter	Data
Material	FEP
Tubing dimensions: to inlet valves and between inlet valves and pumps	Inner diameter (i.d.) 4.8 mm (3/16 inch) Outer diameter (o.d.) 6.4 mm (1/4 inch)
Tubing dimensions: after the pumps	i.d. 3.2 mm (1/8 inch) o.d. 4.8 mm (3/16 inch)
Connector type	SNAP connector

Wetted materials

Module	Materials
Pumps, restrictor/system pressure monitor, air trap valve and column valve	Elgiloy, FFPM/FFKM, PEEK, ZrO ₂ , Titanium, Titanium Gr. 2, UHMWPE, Ruby
Inlet Valve A1-A3, A4-A6, A7-A9	FPM/FKM, PEEK
Inlet Valve B1-B3, B4-B6	FPM/FKM, PEEK
Stainless steel filter housing	ASTM 316L, FEP, FFPM/FFKM, PEEK, Titanium Gr. 2
Filter capsule mounting kit	EPDM, FEP, PEEK, Titanium Gr. 2
Mixer	FFPM/FFKM, PEEK, PTFE, Titanium Gr. 2
Air trap	Glass, FFPM/FFKM, PEEK, Titanium Gr. 2
pH monitor	FFPM/FFKM, PEEK, Titanium Gr. 2
pH sensor	Glass, PEEK, PTFE
Conductivity monitors	PCTFE, PEEK, Titanium Gr. 2
UV-cell 2 mm	Glass, PEEK, Titanium Gr. 2

Module	Materials
UV-cell 5 mm	FFPM/FFKM, Glass, PEEK, Titanium Gr. 2
Outlet Valve 1/Waste-3, Outlet Valve 4-6, Outlet Valve 7-9, Outlet Valve 10-12, Outlet Valve 13-15	FPM/FKM, PEEK, Titanium Gr. 2
External Air Sensor 1, 2, 3, 4	PEEK

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