Install I/O-box E9

Installation Instructions

Scope

This document describes how to install and connect I/O-box **E9** on ÄKTA™ systems.

Introduction

I/O-box **E9** is used to connect external equipment to an ÄKTA system.

Depending on the ÄKTA system, one or two I/O-box **E9** units can be installed. Refer to the *Operating Instructions* of the instrument for more information.

The table below lists the number of signals supported by one I/O-box **E9**.

Signal type	Input signals	Output signals
Digital	4	4
Analog	2	2

Installation summary

The installation procedure for I/O-box **E9** is summarized below.

Step	Action
1	Check/Set the Node ID of I/O-box **E9**. For details, see *Node ID, on page 8*.
2	Place the I/O-box **E9** as required. For details, see *Location, on page 2*.
3	Connect the I/O-box **E9** to the instrument. For details, see *Connect the I/O-box E9 to the ÄKTA system, on page 3*.

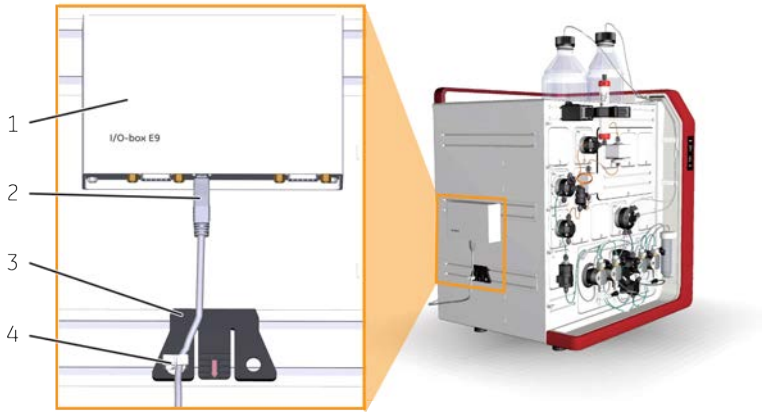
Step	Action
4	Connect the external equipment to the I/O-box **E9**. For details, see *Connect the external equipment to the I/O-box E9, on page 3*.
5	Add the I/O-box **E9** to the system properties in UNICORN software. For details, see *Software configuration, on page 8*.

Location

I/O-box **E9** can be placed in various locations. As a general recommendation, place the external equipment close to the I/O-box **E9**, on the same side of the ÄKTA system. See the documentation for the respective ÄKTA system for more information.

To place I/O-box **E9** on the laboratory bench, attach the adhesive feet on the I/O-box. To place I/O-box **E9** on the side of the ÄKTA system or on an Extension stand, use a multi-purpose holder with cable clip to secure the cable as illustrated below.

The illustration shows I/O-box **E9** placed on the side of ÄKTA pure.



Part	Description
1	I/O-box
2	UniNet-9 F-type cable
3	Multi-purpose holder
4	Clip

Protection class

The I/O-box **E9** has protection class IP23 when mounted on the side of the ÄKTA system or on the ÄKTA Pilot 600 Extension stand according to *Location, on page 2*. In all other locations, the protection class is IP20.

Connect the I/O-box E9 to the ÄKTA system

Follow the steps below to connect the I/O-box **E9** to the ÄKTA system.

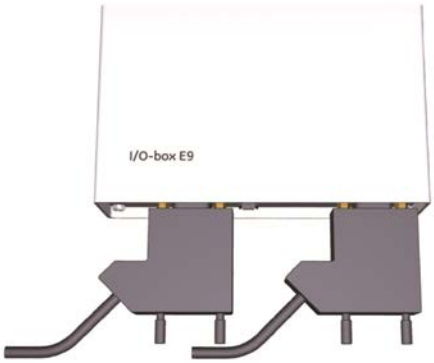
Step	Action
1	Switch off power to the ÄKTA system.
2	Remove the jumper from an unused UniNet-9 port on the ÄKTA system. ***Note:*** *Make sure that all UniNet-9 ports on the ÄKTA system are occupied by either jumpers or connected equipment. Do not use the port marked* **Test***.*
3	Connect a UniNet-9 cable between the UniNet-9 connector on the I/O-box **E9** and the UniNet-9 port on the ÄKTA system.

Connect the external equipment to the I/O-box E9

Follow the steps below to connect the external equipment to the I/O-box **E9**.

Step	Action
1	Prepare D-sub connectors according to the requirements of the external equipment. See *Cable assembly, on page 10* for an instruction example. ***Note:*** *Pin assignments and signal specifications for analog and digital connectors on I/O-box* **E9** *are specified in Connectors and cable, on page 4. Refer to the manufacturer's instructions of the external equipment for pin assignments and specifications.* *Make sure that the polarity of analog connections is correct. Connect the digital signal ground or return path for the external equipment to the Signal ground pin.* *Keep the length of signal cables from the external equipment to a minimum to maintain signal quality.*

Step	Action
2	Connect the D-sub cable to the **Digital in/out** or **Analog in/out** signal connector as appropriate. Tighten the screws to keep the connectors in place.



Connectors and cable

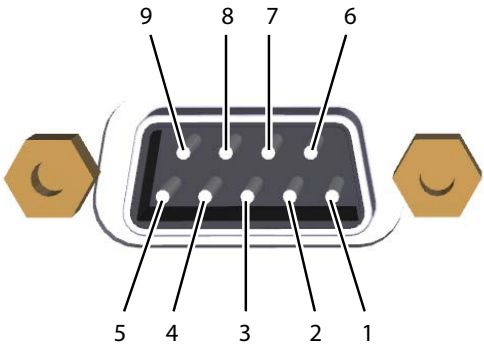
I/O-box **E9** is provided with a cable to connect to external equipment. The image and tables below describe the parts in I/O-box **E9** and the functions of the analog and digital connector pins.

To assemble an appropriate cable to connect an external equipment to the I/O-box, check the function of the connector pins in the external equipment. See *Cable assembly, on page 10* as an example.

Part	Description
Analog in/out	Signal connector for analog input and output signals.
UniNet-9	Connector used to connect the I/O-box to the ÄKTA system.
Status	Status indicator for service purposes.

Part	Description
Node ID	Switches used to set the Node ID (see *Node ID, on page 8*).
Digital in/out	Signal connector for digital input and output signals.

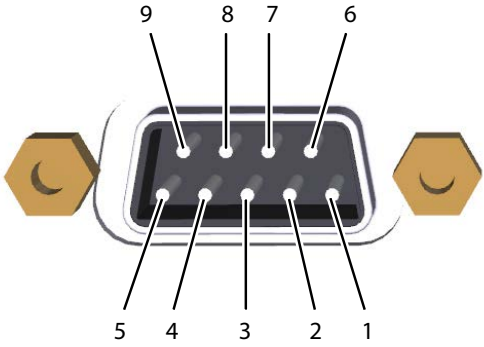
Analog connector pins



Part	Function
1	Analog in signal 1 +
2	Analog in signal 1 - (or signal ground)
3	Shield, analog in (both ports)
4	Analog in signal 2 +
5	Analog in signal 2 - (or signal ground)
6	Calibration pin for service purposes Analog out signal (1.9 V) ***Note:*** *Do not use for other purposes.*
7	Analog out signal 1
8	Signal ground, analog out (both ports)

Part	Function
9	Analog out signal 2

Digital connector pins



Part	Function
1	Digital in signal 1
2	Digital in signal 2
3	Digital in signal 3
4	Digital in signal 4
5	Signal ground
6	Digital out signal 1
7	Digital out signal 2
8	Digital out signal 3
9	Digital out signal 4

Signal specifications

The signal characteristics for the connected equipment are described in the following tables. All connected equipment must have a common ground.

Analog input

Parameter	Value
Channels	2
Range	± 2000 mV
Input impedance	1 MΩ
Accuracy	± (0.1% + 0.2 mV)

Analog output

Parameter	Value
Channels	2
Range	± 1000 mV
Input impedance	100 kΩ
Accuracy	± (0.3% + 1 mV)

Digital input

Parameter	Value
Channels	4
Compatibility	5V TTL, open/closed circuit

Digital output

Parameter	Value
Channels	4
Compatibility	Max 5 V, open/closed circuit

Node ID

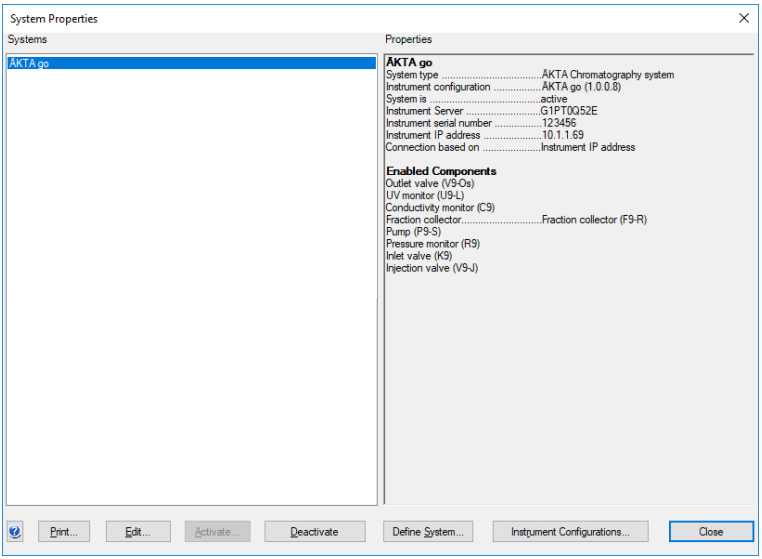
The Node ID is a 1- or 2-digit number that identifies instrument modules in UNICORN™ system control software. The Node ID is set by the position of the 2 rotary switches on the back panel of I/O-box **E9** as specified in the table below. Use a small screwdriver to change the setting if required.

Module	Left-hand switch	Right-hand switch
First I/O-box **E9**	0	0
Second I/O-box **E9**	0	1

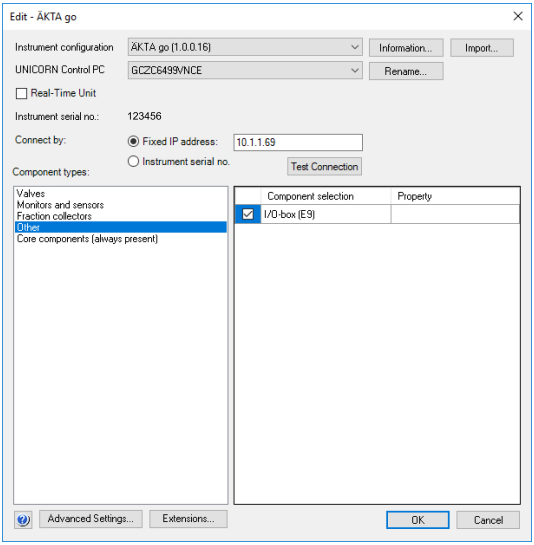
Software configuration

Add the module to the system configuration in UNICORN software as follows. See the ÄKTA system or UNICORN documentation for more details.

Step	Action
1	Switch on the ÄKTA system.
2	Open ***System Properties*** in the UNICORN ***Administration*** module.



Step	Action
3	Select the desired system and click ***Edit***.
4	Choose ***Other*** as the ***Component type*** and check ***I/O box (E9)*** or ***I/O box 2 (E9)*** as appropriate.



5	Click ***OK***. If a warning that the system will be disconnected appears, click ***Yes***.
6	Adjust the system delay volumes if the external equipment adds flow path components between the UV monitor and the fraction collector or outlet valves.

Cable assembly

Control Pump P1 from UNICORN via I/O-box E9

To assist in the assembly of a cable to connect external equipment to I/O-box **E9**, we provide this example instruction. The instruction provides guidance to assemble a cable to connect Pump **P1** to an ÄKTA system via I/O-box **E9**.

Required material

- 15-pin male connector of D-type.
- 9-pin female connector of D-type.
- Shielded cable with 9 conductors, with 4 to 8 mm diameter.
- Wire strip tool.

Instruction

Follow the steps below to assemble a cable to connect Pump **P1** to I/O-box **E9**.

Step	Action
1	Establish an earth connection, using one of the conductor wires in the cable: • Connect one end of the wire to pin 5 of the 9-pin connector. • Connect the other end of the wire to pin 15 of the 15-pin connector.
2	Establish an external speed control, using one of the conductor wires in the cable: • Connect one end of the wire to pin 6 of the 9-pin connector. • Connect the other end of the wire to pin 12 of the 15-pin connector.
3	Connect the 15-pin connector to Pump **P1** and the 9-pin connector to I/O-box **E9**.

Tip: *The wires in the shielded cable are color-coded to facilitate identification.*

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