

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 .

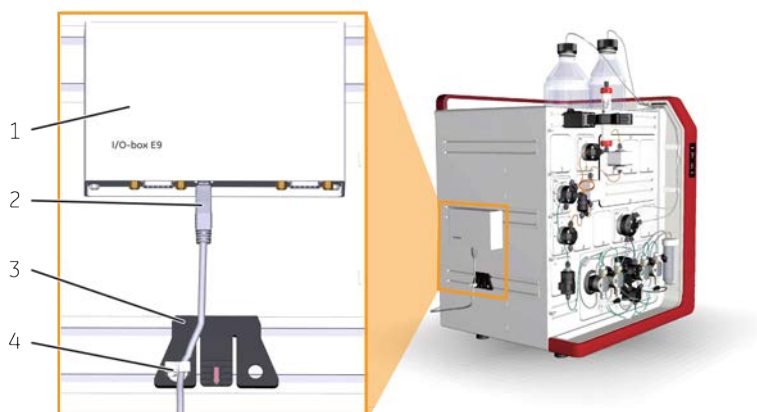
Step	Action
4	Connect the external equipment to the I/O-box E9 . For details, see Connect the external equipment to the I/O-box E9, on page 3 .
5	Add the I/O-box E9 to the system properties in UNICORN software. For details, see Software configuration, on page 8 .

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.

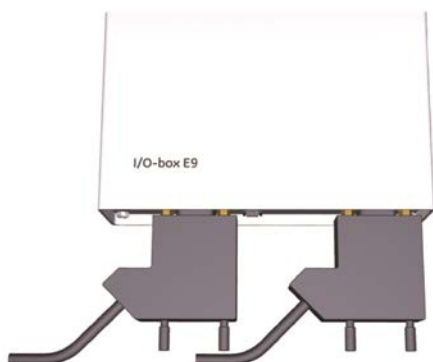
Step	Action
1	Switch off power to the ÄKTA system.
2	Remove the jumper from an unused UniNet-9 port on the ÄKTA system. Note: <i>Make sure that all UniNet-9 ports on the ÄKTA system are occupied by either jumpers or connected equipment. Do not use the port marked Test.</i>
3	Connect a UniNet-9 cable 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: <i>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.</i> <i>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.</i> <i>Keep the length of signal cables from the external equipment to a minimum to maintain signal quality.</i>

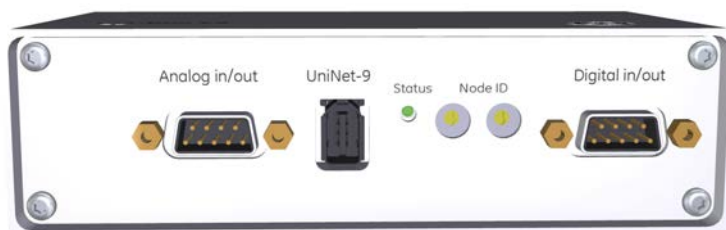
Step	Action
2	Connect the D-sub cable to the Digital in/out or Analog in/out signal connector as appropriate. Tighten the screws to keep the connectors in place.



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.

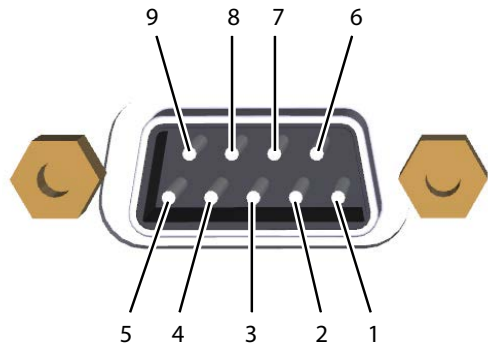
To assemble an appropriate cable to connect an external equipment to the I/O-box, check the function of the connector pins in the external equipment. See [Cable assembly, on page 10](#) as an example.



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.

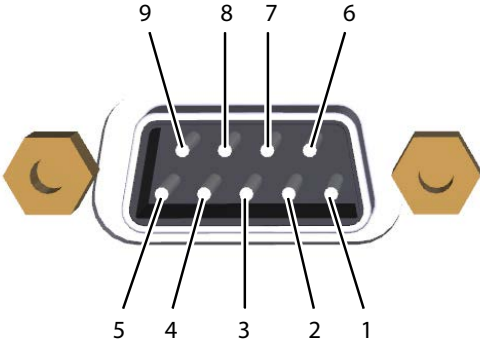
Analog connector pins



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: <i>Do not use for other purposes.</i>
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	$\pm 2000\text{ mV}$
Input impedance	$1\text{ M}\Omega$
Accuracy	$\pm (0.1\% + 0.2\text{ mV})$

Analog output

Parameter	Value
Channels	2
Range	$\pm 1000\text{ mV}$
Input impedance	$100\text{ k}\Omega$
Accuracy	$\pm (0.3\% + 1\text{ mV})$

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

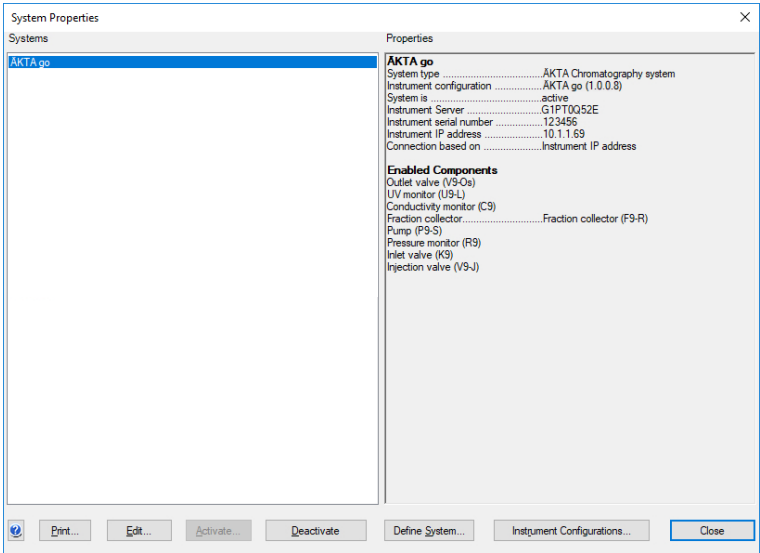
The Node ID is a 1- or 2-digit number that identifies instrument modules in UNICORN™ system control software. The Node ID is set by the position of the 2 rotary switches on the back panel of I/O-box **E9** as specified in the table below. Use a small screwdriver to change the setting if required.

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

Software configuration

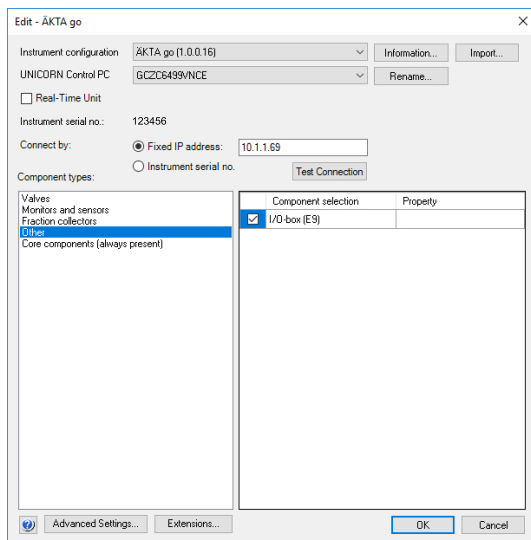
Add the module to the system configuration in UNICORN software as follows. See the ÄKTA system or UNICORN documentation for more details.

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



Step	Action
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|---|---|
| 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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