

I/O Port API

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1 I/O Port API

1.1 Description

Most Axis products have integrated digital input and output ports which enable connection to external devices such as detectors, lights, switches and alarm relays. The number of I/O ports is product dependent. In some products, each I/O port can be configured to act as input or output.

Input ports – For external alarm devices that can toggle between an open and grounded (closed) circuit, for example a pushbutton or a door sensor. Devices connected to input ports are usually used to trigger alarms.

Output port – For external alarm devices such as relays and LEDs that, for example, are to be activated by a triggered/scheduled event.

Note

The `port.cgi` described in this document replaces the `input.cgi` and `output.cgi` from VAPIX version 2. The `input.cgi` and `output.cgi` are obsolete but supported for backwards compatibility. For products with configurable ports, `port.cgi` must be used.

1.1.1 Prerequisites

1.1.1.1 Identification

Property: `Properties.API.HTTP.Version=3`.

Firmware: 5.00 and later

Product category: Products with I/O connectors

To configure Port $n+1$ (n is a non-negative integer) the product requires:

Parameter: `IOPort.In.Configurable=yes`

1.1.2 Percent Encoding

HTTP and RTSP VAPIX requests must follow the URI generic syntax defined in RFC 3986. Use character encoding ISO/IEC 8859-1. If a parameter in the request contains characters that are not allowed in a URI, these characters must be percent-encoded. That is, characters such as `/`, `\`, `:`, `=`, `&`, `?`, etc in a `<argument>` or a `<value>` must be replaced by `%<ASCII hex>`.

Correct:

```
http://<servername>/axis-cgi/record/continuous/addconfiguration.cgi?diskid=SD_DISK
&options=resolution%3D640x480
```

Wrong:

```
http://<servername>/axis-cgi/record/continuous/addconfiguration.cgi?diskid=SD_DISK
&options=resolution=640x480
```

For more information and a list of allowed characters, refer to RFC 3986.

1.2 Numbering of I/O Ports

The numbering of the I/O ports starts from **one** in `port.cgi` requests and in all responses except in the response to the monitor request. In the response to the monitor request, port numbering starts from **zero**. For the `IOPort.I#` parameter groups port numbering starts from **zero**.

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The physical port labeled n is thus n in `port.cgi` requests, but by $n-1$ in the response to the monitor request. The corresponding parameter group is `IOPort.I(n-1)`.

1.3 Common Examples

Example 1:

Check the number of configured inputs.

```
http://myserver/axis-cgi/param.cgi?action=list&group=Input.NbrOfInputs
```

Response:

HTTP Code: 200 OK

Content-Type: text/plain

Body:

```
Input.NbrOfInputs=3
```

Example 2:

Check the number of configured outputs.

```
http://myserver/axis-cgi/param.cgi?action=list&group=Output.NbrOfOutputs
```

Response:

HTTP Code: 200 OK

Content-Type: text/plain

Body:

```
Output.NbrOfOutputs=1
```

Example 3:

Check if port 1 is configurable.

```
http://myserver/axis-cgi/param.cgi?action=list&group=IOPort.I1.Configurable
```

Response:

HTTP Code: 200 OK

Content-Type: text/plain

Body:

```
IOPort.I1.Configurable=yes
```

Example 4:

Set port 2 to active for 300 ms, wait 500 ms and then set the port to active for another 300 ms. That is, create two 300 ms pulses with a 500 ms delay between the pulses. Some characters in the action argument `action=2:/300\500/300\` must be percent-encoded.

```
http://myserver/axis-cgi/io/port.cgi?action=2%3A%2F300%5C500%2F300%5C
```

Example 5:

Check status of port 1 and 2.

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```
http://myserver/axis-cgi/io/port.cgi?check=1,2
```

Response:

HTTP Code: 200 OK

Content-Type: text/plain

Body:

```
port1=0  
port2=0
```

Example 6:

Check if port 3 is active.

```
http://myserver/axis-cgi/io/port.cgi?checkactive=3
```

Response:

HTTP Code: 200 OK

Content-Type: text/plain

Body:

```
port3=inactive
```

Example 7:

Monitor data on port 3. Note how port numbering starts from zero in the response.

```
http://myserver/axis-cgi/io/port.cgi?monitor=3
```

a) Port 3 is an input port.

Response:

HTTP Code: 200 OK

Content-Type: multipart/x-mixed-replace; boundary=ioboundary

Body:

```
--ioboundary  
Content-Type: text/plain  
  
2I:/  
  
--ioboundary  
Content-Type: text/plain  
  
2I:H  
  
--ioboundary  
Content-Type: text/plain  
  
2I:\n  
  
--ioboundary  
Content-Type: text/plain  
  
2I:L
```

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```
--ioboundary
Content-Type: text/plain

--ioboundary
Content-Type: text/plain

...
```

The characters / and \ indicate a change in the state. The characters H and L indicate that the state is unchanged.

Note

Non-empty boundaries are sent when the port status changes. If there are no changes, empty boundaries are sent at 15-second intervals.

b) Port 3 is an output port.

Response:

HTTP Code: 200 OK

Content-Type: multipart/x-mixed-replace; boundary=ioboundary

Body:

```
--ioboundary
Content-Type: text/plain

20:/

--ioboundary
Content-Type: text/plain

20:H

--ioboundary
Content-Type: text/plain

20:\

--ioboundary
Content-Type: text/plain

20:L

--ioboundary
Content-Type: text/plain

--ioboundary
Content-Type: text/plain

...
```

The characters / and \ indicate a change in the state. The characters H and L indicate that the state is unchanged.

Note

Non-empty boundaries are sent when the port status changes. If there are no changes, empty boundaries are sent at 15-second intervals.

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1.4 I/O Parameters

1.4.1 Port Settings

The settings for the physical I/O port numbered # are defined by the group `IOPort.I#`, where # is an integer starting from 0 (zero) for the first physical port. These parameters are handled by `param.cgi`.

[`IOPort.I#`]

Parameter	Default value	Valid values	Security level	Description
<code>Configurable</code>	<code>yes</code> ¹	<code>yes</code> <code>no</code>	admin: read operator: read	The port is configurable or not.
<code>Direction</code>	<code>input</code>	<code>input</code> <code>output</code>	admin: read, write operator: read	The port is configured to act as input or output. Read-only for non-configurable ports.
<code>Input.Name</code> ²	<code>input n+1</code> ³	A string	admin: read, write operator: read	User-friendly name for the input.
<code>Input.Trig</code>	<code>closed</code>	<code>closed</code> <code>open</code>	admin: read, write operator: read	Determines when to trig. <code>closed</code> =The input port triggers when the circuit is closed <code>open</code> =The input port triggers when the circuit is open.
<code>Output.Name</code> ⁴	<code>Output n+1</code> ³	A string	admin: read, write operator: read	User-friendly name for the output.
<code>Output.Active</code> ⁴	<code>closed</code>	<code>closed</code> <code>open</code>	admin: read, write operator: read	The active state of the output. <code>closed</code> =The output port is active when the circuit is closed <code>open</code> =The output port is active when the circuit is open.
<code>Output.Button</code> ⁴	<code>none</code>	<code>none</code> <code>pulse</code> <code>actinact</code>	admin: read, write operator: read	Internal use.
<code>Output.PulseTime</code> ⁴	<code>0</code>	An integer	admin: read, write operator: read	Internal use.

1. Product/release dependent. See the product's release notes.
2. Supported by products with configurable output ports.
3. n is a non-negative integer.
4. Supported by products with configurable input ports.

1.4.2 Input Parameters

`Input` defines the input parameters. The parameter is handled by `param.cgi`.

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[Input]

Parameter	Default values	Valid values	Access control	Description
NbrOfInputs	0 ¹	An integer	admin: read operator: read viewer: read	Number of inputs. When the ports are configurable this parameter is updated automatically to match the number of configured inputs. This means that this number is not related to the physical number of inputs for configurable ports.

1. Product-dependent. Check the product's specification.

1.4.3 Output Parameters

Output defines the output parameters. The parameter is handled by `param.cgi`.

[Output]

Parameter	Default values	Valid values	Access control	Description
NbrOfOutputs	0 ¹	An integer	admin: read operator: read viewer: read	Number of outputs. When the ports are configurable this parameter is updated automatically to match the number of configured outputs. This means that this number is not related to the physical number of outputs for configurable ports.

1. Product-dependent. Check the product's specification.

1.5 HTTP API

1.5.1 Manage I/O Ports – port.cgi

Use `io/port.cgi` to retrieve information about port status and directions, to activate and deactivate ports and to monitor ports.

Important

In `port.cgi` requests and in all responses except the monitor response, port numbering (Port ID below) starts from one (where one corresponds to the physical port labeled '1'). In the monitor response port numbering starts from **zero**.

Security level: viewer

Method: GET

```
http://<servername>/axis-cgi/io/port.cgi?  
<argument>=<value>[&<argument>=<value>...]
```

With the following arguments and values:

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Argument	Valid values	Description
check=<int>[,<int>,...]	<Port ID 1>[<Port ID 2>,...]	Return the status (1 or 0) of one or more ports numbered <Port ID 1>, <Port ID 2>, ... 1 = Closed circuit. 0 = Open circuit.
checkactive=<int>[,<int>,...]	<Port ID 1>[,<Port ID 2>,...]	Return the status (active or inactive) of one or more ports numbered <Port ID 1>, <Port ID 2>, ... This value depends on the parameters Output.Active for an output and Input.Trig for an input. If the port is an output and Output.Active is configured as closed, then this request will return active if the port state is closed. The same goes for an input port that has Input.Trig configured as closed.
checkdirection=<int>[,<int>,...]	<Port ID 1>[,<Port ID 2>,...]	Return the port direction (input or output) of one or more ports numbered <Port ID 1>, <Port ID 2>,...
monitor=<int>[,<int>,...] ¹	<Port ID 1>[,<Port ID 2>,...]	Return a multipart stream of "check" ports (see return description below). Input and output ports must be monitored separately.
action=<string> ²	[<Port ID>]:<a>[<wait><a>...]	Activate or deactivate an output. Use the <wait> option to activate/deactivate the port for a limited period of time. <Port ID> = Port name. Default: Name from Output.Name <a> = Action character. /=active, \=inactive <wait> = Delay before the next action. Unit: milliseconds Note: The ;, / and \ characters must be percent-encoded in the URI. See <i>Percent Encoding</i> . Example: To set output 1 to active, use 1:/. In the URI, the action argument becomes action=1%3A%2F

1. Outputs and inputs must be monitored separately.
2. Valid for output ports only.

Example 1:
Retrieve information about port 1.

```
http://myserver/axis-cgi/param.cgi?action=list&group=IOPort.I0
```

Response:

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HTTP Code: 200 OK
Content-Type: text/plain

```
root.IOPort.I0.Configurable=yes
root.IOPort.I0.Direction=output
root.IOPort.I0.Input.Name=Input 1
root.IOPort.I0.Input.Trig=closed
root.IOPort.I0.Output.Name=Output 1
root.IOPort.I0.Output.Active=open
root.IOPort.I0.Output.Button=actinact
root.IOPort.I0.Output.PulseTime=0
```

Example 2:

Configure port 2 to act as output. This example is only applicable to configurable ports.

```
http://myserver/axis-cgi/param.cgi?action=update&IOPort.I2.Direction=output
```

Example 3:

Set port 2 to active, wait 300 ms and then set the port to inactive. Some characters in the action argument `action=2:/300\` must be percent-encoded.

```
http://myserver/axis-cgi/io/port.cgi?action=2%3A%2F300%5C
```

1.5.1.1 Responses

1.5.1.2 Successful Request, All Arguments Except Monitor

Response:

HTTP Code: 200 OK
Content-Type: text/plain

```
<Port ID>=<information>
```

Note

The body is empty for the action argument.

1.5.1.3 Successful Request, Argument Monitor

Important

In `port.cgi` requests and in all responses except the monitor response, port numbering (`Port ID` below) starts from one (where one corresponds to the physical port labeled "1"). In the monitor response port numbering starts from zero.

Response:

HTTP Code: 200 OK
Content-Type: multipart/x-mixed-replace; boundary=<boundary>

Body:

```
--<boundary>
<monitor data>
```

Where the returned `<monitor data>` is:

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```
<Port ID><port direction>:<action character>  
--<boundary>  
<monitor data>
```

Here *id* is the port and *port direction* is I for inputs and O for outputs. The *action character* is / or H for active and \ or L for inactive ports. The characters / and \ indicates a change in the state. The characters H and L indicates that the state is unchanged.

Note

Non-empty boundaries are sent when the port status changes. If there are no changes, empty boundaries are sent at 15-second intervals.

1.6 I/O Events and Actions

1.6.1 Digital Input Event

The Digital Input event is `true` if the digital I/O port configured as input is active. There is one event for each input port. The Any event is `true` if any of the input ports is active.

Topic

Name: `tns1:Device/tnsaxis:IO/tnsaxis:Port`
Type: Stateful
Nice name: Digital input port
Source instance

Nice name: Port
Type: integer
Name: `port`

Value	Nice name
-1	Any
0	User-defined name (default Input 1)
1	User-defined name (default Input 2)
...	...
n	User-defined name (default Input n+1)

Data instance

Nice name: Active
Type: boolean
Name: `state`
isPropertyState: `true`

1.6.2 Virtual Input Event

The Virtual Input event is `true` if the virtual input is active. There is one event for each virtual input.

Topic

Name: `tns1:Device/tnsaxis:IO/tnsaxis:VirtualInput`
Type: Stateful
Nice name: Virtual input
Source instance

Nice name: Input

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Type: integer

Name: port

Value	Nice name
1	Input 1
2	Input 2
...	...
32	Input 32

Data instance

Nice name: Active

Type: boolean

Name: active

isPropertyState: true

1.6.3 Manual Trigger Event

The Manual Trigger event is true if the manual trigger is active. The manual trigger can be activated using `axis-cgi/io/virtualinput.cgi` or using the button in the product's Live View page. For products with multiple view areas or multiple video channels, there is one manual trigger for each view area or video channel. The `channel` element in `SourceInstance` specifies the view area or video channel.

Topic

Name: `tns1:Device/tnsaxis:IO/tnsaxis:VirtualPort`

Type: Stateful

Nice name: Manual trigger

Source instance

Nice name: Channel

Type: integer

Name: port

Value	Nice name
1	–
2	–
...	–
number of channels/view areas	–

Data instance

Nice name: Active

Type: boolean

Name: state

isPropertyState: true

1.6.4 Output Port Action

The Output Port action is used to activate and inactive the product's output ports.

This action can be run as:

- **fixed action** – set the port state when action is triggered and return to the opposite state after the time defined by parameter `duration`

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unlimited action – set the port state when the action is triggered and return to the opposite state when event conditions are no longer fulfilled

Action ID: `com.axis.action.fixed.io.toggle`

Action ID: `com.axis.action.unlimited.io.toggle`

Parameter	Valid values	Description
<code>port</code>	Unsigned integer	The I/O port number of the output port to activate. The I/O ports are numbered starting from zero. The I/O port number is the # of parameter <code>IOPort.I#</code> .
<code>state</code>	<code>high</code> <code>low</code>	State to set the port to.
<code>duration</code>	Unsigned integer	Fixed actions: Number of seconds before returning to the opposite state. Use <code>duration = 0</code> if the port should remain in the set state.

VAPIX® version 3

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Ver. M6.4

Date: November 2015

Part No. 53980