IRU151_IRU152

OPC UA User Manual

Revision History

Version	Revision Date	Author	Description
1.0	2018/07/18	Ryan	1st release

Table of Contents

CHAPTER 1
Introduction

This document provides detailed information on how to use the IRU152/IRU151 OPC UA Server. It also shows how to control the DIO function and easily acquire AI single value via the OPC UA Server.

CHAPTER 2
Function List

This chapter describes the functions of the IRU151_152 OPC UA server. Information of the available nodes is as follows:

Node	Node type	Description
Set_AI	Method	Set AI channel and input range.
Get_AI_SingleValue	Variable	Get the AI single voltage.
Get_DO_Status	Variable	Read state on digital output channels.
Get_DI_Status	Variable	Read state on digital input channels.
Set_DO_PWM	Method	Set digital output channel 0 as PWM mode
Set_DI_Counter	Method	Set digital input channel 0 as DI counter mode
Get_DI_Counter	Variable	Read digital input channel 0 counter number
Set_DO_Status	Method	Set digital output channels state.

2.1 Set_AI

- Description

  Set the AI channels and input range.

- Input Arguments

  Input 0 : Setting AI channel; bit 0 to 3 indicates channel 0 ~ 3.

  1 : Setting channel 0 enable.

  2 : Setting channel 1 enable.

  3 : Setting channel 2 enable.

  ⋮

  15 : Setting channel 0 – 3 enable.

  Input 1 : Setting AI input range.

  0 : 0V ~ +5V.

  1 : 0V ~ +10V.

  2 : -5V ~ +5V.

  3 : -10V ~+10V.

- Output Arguments

  Output 0 : Return setting channel function status code.

  0 : Success.

  Other : Represents an error (See Error Code).

  Output 1 : Return setting input range function status code.

  0 : Success.

  Other : Represents an error (See Error Code).

2.2 Get_AI_SingleValue

- Description

  Get the AI single voltage with the selected channels and input range.

- InputArguments

  [None]

- OutputArguments

  Output 0 : Return AI single value data.

2.3 Set_DO_Status

- Description

  Set the DO status on the selected channel.

- InputArguments

  Input 0 : Setting DO channel; bit 0 to 1 indicates channel 0 ~ 1.

  1 : channel 0.

  2 : channel 1.

  3 : channel 0 & channel 1.

  Input 1 : Setting DO level; bit 0 to 1 indicates the status of channel 0 ~ 1.

  0 : channel 0 & channel 1 as Low.

  1 : channel 0 as High; channel 1 as Low.

  2 : channel 0 as Low; channel 1 as High.

  3 : channel 0 & channel 1 as High.

- OutputArguments

  Output 0 : Return set DO status function status code.

  0 : success.

  Other : Represents an error (See Error Code).

2.4 Get_DO_Status

- Description

  Get the DO status on the selected channel.

- InputArguments

  [None]

- OutputArguments

  Output 0 : Return current DO output status.

  0 : channel 0 & channel 1 as Low .

  1 : channel 0 as High; channel 1 as Low.

  2 : channel 0 as Low; channel 1 as High.

  3 : channel 0 & channel 1 as High.

2.5 Get_DI_Status

- Description

  Get current DI status.

- InputArguments

  [None]

- OutputArguments

  Output 0 : Return current DI status.

  0 : channel 0 & channel 1 as Low.

  1 : channel 0 as High; channel 1 as Low.

  2 : channel 0 as Low; channel 1 as High.

  3 : channel 0 & channel 1 as High.

2.6 Set_DO_PWM

- Description

  Enable PWM mode on channel 0 and set required parameters.

- InputArguments

  Input 0 : Setting the range of the duty cycle, from 1(%) to 99(%).

  0 : stop PWM mode

  1(%) to 99(%) : Setting the range of the duty cycle and start PWM mode

  Input 1 : Setting the range of the value, from 1 to 500(Hz).

- OutputArguments

  Output 0 : Return set DO PWM function status code.

  0 : success.

  Other : Represents an error (See Error Code).

2.7 Set_DI_Counter

- Description

  Enable the DI channel 0 as counter mode.

- InputArguments

  Input 0 : Setting the trigger condition .

  0 : Raising edge.

  1 : Falling edge.

  2 : Both.

  Input 1 : Setting the number of counts (1~65535).

- OutputArguments

  Output 0 : Return set DI counter function status code.

  0 : success.

  Other : Represents an error (See Error Code).

2.8 Get_DI_Counter

- Description

  Get current DI counter number.

- InputArguments

  [None]

- OutputArguments

  Output 0 : Return current DI counters.

CHAPTER 3
How to Start an OPC UA Server

This section describes how to install an OPC UA server. The OPC UA demo server application is available on the Axiomtek website. Please download and install the IRU151_152-OPCUA-application in the IRU151 or IRU152 system

~# ls

```
root@rsb201:~# ls
IRU151-152_OPCUA.tar.gz
```

Extract IRU151-152_OPCUA.tar.gz

~# tar xvf IRU151-152_OPCUA.tar.gz -C .

```
root@rsb201:~# tar xvf IRU151-152_OPCUA.tar.gz -C .
IRU151-152_OPCUA /
IRU151-152_OPCUA /OPCUA_lib/
IRU151-152_OPCUA /OPCUA_lib/libopcua.so.1.3.1
IRU151-152_OPCUA /bin/
IRU151-152_OPCUA /OPCUA_lib/libopcua.so.0
IRU151-152_OPCUA /install.sh
IRU151-152_OPCUA /OPCUA_lib/libopcua.so
IRU151-152_OPCUA /bin/DemoServerOPCUA
IRU151-152_OPCUA /OPCUA_lib/libopcua.o
```

Install library. Please enter IRU151-152_OPCUA directory and run install.sh scripit

~# cd IRU151-152_OPCUA

~# ./install

```
root@rsb201:~# cd IRU151-152_OPCUA
root@rsb201:~/IRU151-152_OPCUA# ./install.sh
Install OPC UA library successfully.
```

After installing library, run OPCUA application located in IRU151-152_OPCUA/bin.

~# cd bin

~# ./DemoServerOPCUA

```
root@rsb201:~/IRU151-152_OPCUA# cd bin/
root@rsb201:~/IRU151-152_OPCUA/bin# ./DemoServerOPCUA
Usage: ./DemoServerOPCUA [IRU151/IRU152] [Port]
IRU151/IRU152: 0/1
Port: Port number
Example: ./DemoServerOPCUA 1 3088
```

Run the OPC UA application. You must know your system is IRU151 or IRU152 and assign a corresponding port number. If your system is IRU151, follow the example below:

```
root@rsb201:~/IRU151-152_OPCUA/bin# ./DemoServerOPCUA 0 3088
[2018-07-24 01:28:10.944 (UTC+0000)] info/network       TCP network layer listen
ing on opc.tcp://rsb201:3088/
```

If your system is IRU152, follow the example below:

```
root@rsb201:~/IRU151-152_OPCUA/bin# ./DemoServerOPCUA 1 3088
[2018-07-24 01:34:47.472 (UTC+0000)] info/network       TCP network layer listen
ing on opc.tcp://rsb201:3088/
```

If you want to stop the OPC UA server, just press “Ctrl + C”.

```
root@rsb201:~/IRU151-152_OPCUA/bin# ./DemoServerOPCUA 1 3088
[2018-07-24 01:34:47.472 (UTC+0000)] info/network       TCP network layer listen
ing on opc.tcp://rsb201:3088/
^C[2018-07-24 01:35:13.818 (UTC+0000)] info/server      received ctrl-c
[2018-07-24 01:35:13.819 (UTC+0000)] warn/network       Socket select failed wit
h Interrupted system call
[2018-07-24 01:35:13.820 (UTC+0000)] info/network       Shutting down the TCP ne
twork layer
[2018-07-24 01:35:14.102 (UTC+0000)] info/server        Close IRU device.
```

CHAPTER 4
Using the IRU151-152 OPC UA server

This section presents an actual demonstration of running the IRU152-152 OPC UA server. If no OPC UA client tool has been installed, follow steps below to quickly install a simple OPC UA client tool in Ubuntu.

1. Install OPC UA client tool

   1.1 Install host system.

   Download Ubuntu 14.04 LTS iso image and install.

   1.2 Install OPC UA client tool.

   Install host packages required by OPC UA client tool.

   ~$ sudo apt-get update

   ~$ sudo apt-get upgrade

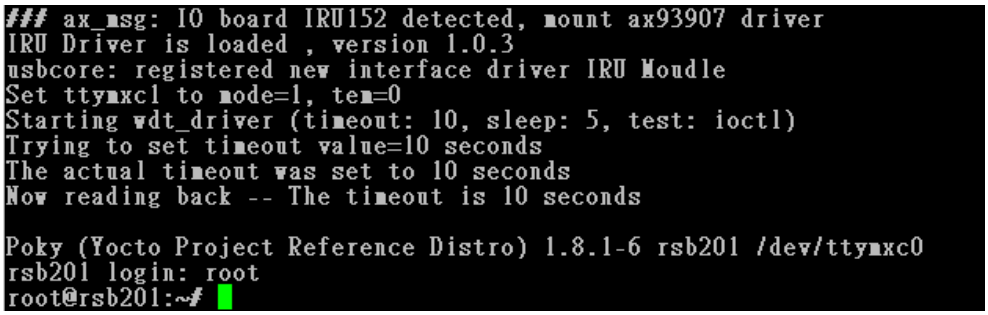
   ~$ sudo apt-get install python3-pip3 python3-pyqt5

   ~$ sudo pip3 install --upgrade pip setuptools

   ~$ sudo pip3 install cryptography pyqtgraph opcua-client

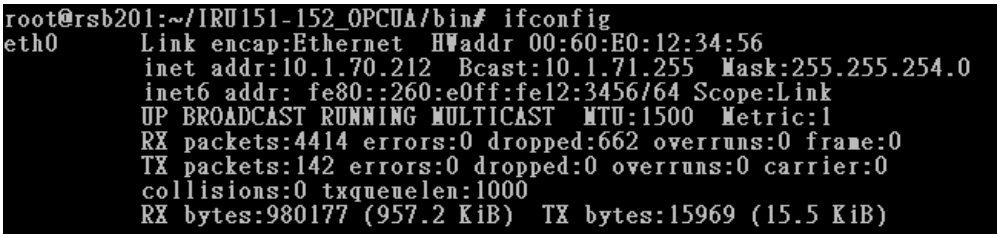
2. Start IRU151 or IRU152 OPC UA server.

   1.1 Power on and connect to IRU151 or IRU152.



   1.2 Check IRU151 or IRU152 IP address, and start OPC UA server.

   ~# ifconfig



~# cd /etc/ax_irutool/demoAP_152/

~# ./DemoServerOPCUA 1 3088

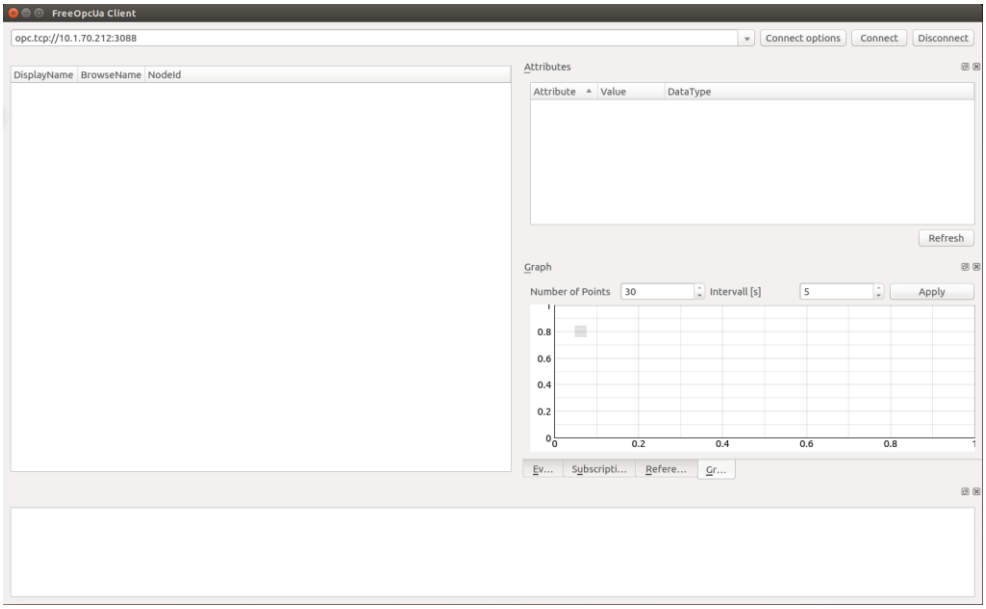
```
root@rsb201:~# cd IRU151-152_OPCUA/bin/
root@rsb201:~/IRU151-152_OPCUA/bin# ./DemoServerOPCUA 1 3088
[2018-07-24 01:37:32.879 (UTC+0000)] info/network       TCP network layer listen
ing on opc.tcp://rsb201:3088/
```

1.3 Connect to OPC UA server by host PC (Ubuntu).

~$ opcua-client

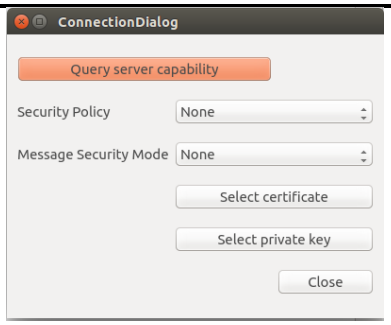
```
axiomtek@axiomtek:~$ opcua-client
```

If connection is successful, the information below will appear.

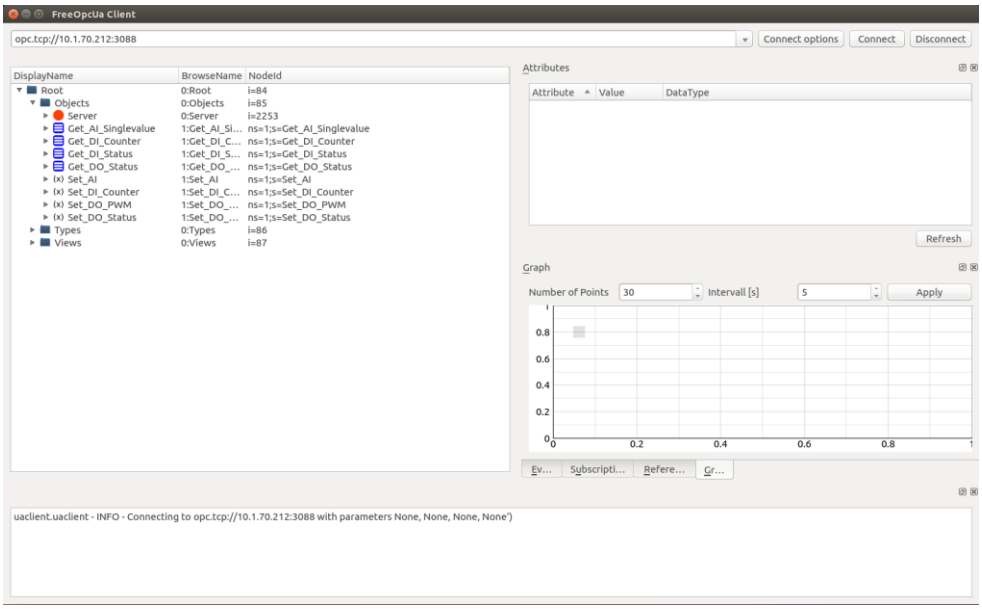


Set OPC UA server ip

Set Connect options as below



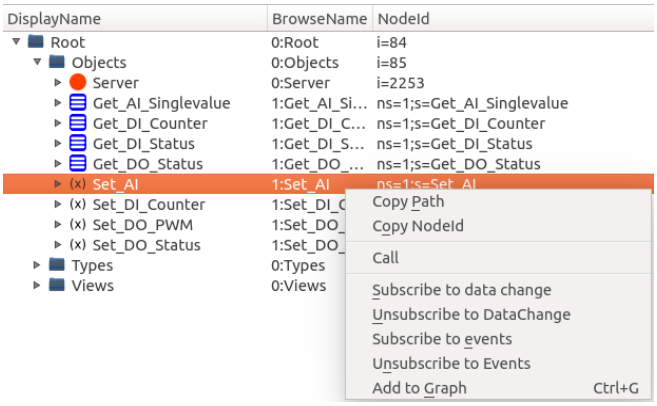
Click Connect. You will see the information below.



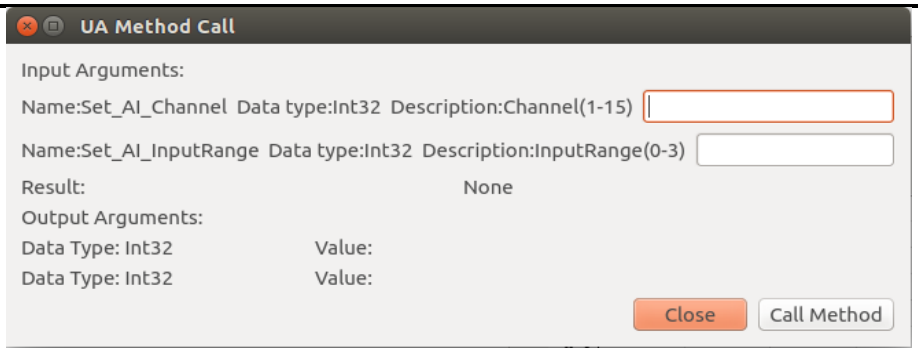
3. Function demo

1.1 Set_AI

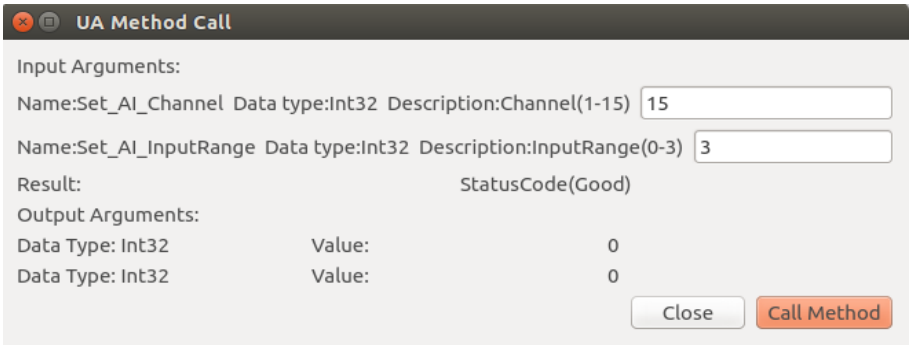
Right click the “Set_AI” item.



Click “Call”, and you will see the information below.



Please input AI Channel number and input range, then click “Call Method”. If succseeful, you will see the information below.



Result : OPC UA server response code

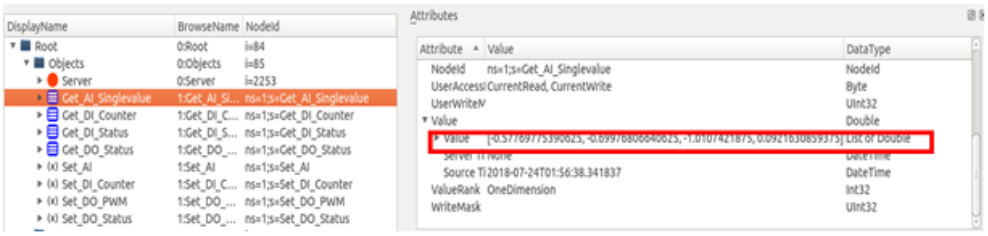
Output Arguments :

Output0 : Set AI channel function response.

Output1 : Set AI input range function response.

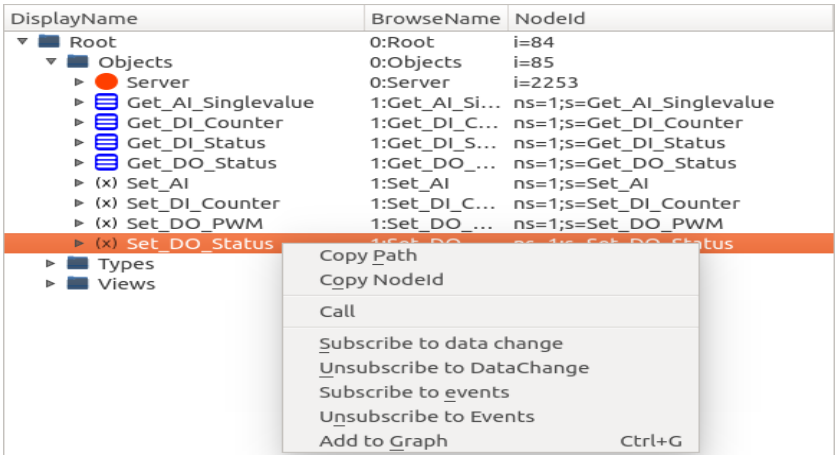
1.2 Get_AI_SingleValue

Click the “Get_AI_SingleValue” item, and you will see the AI single value in the Attributes.

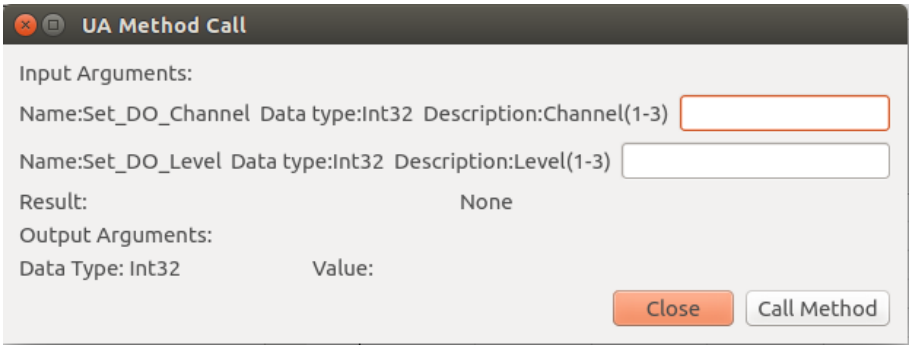


1.3 Set_DO_Status

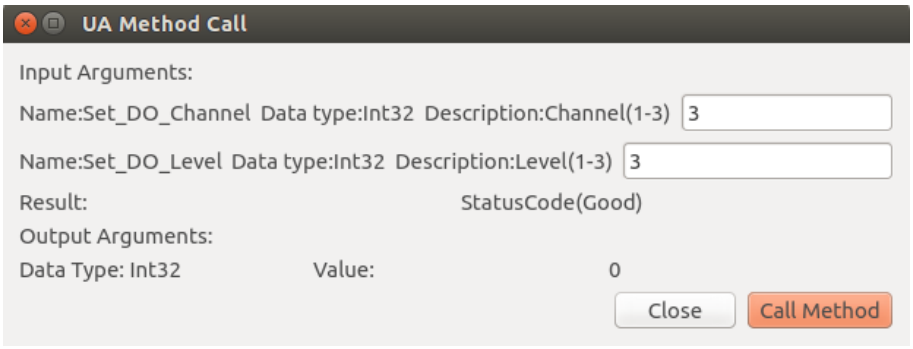
Right Click the “Set_DO_Status” item.



Click “Call”, and you will see the information below.



Set the Channel number and Input level, then click “Call Method”. if successful, you will see the information below.



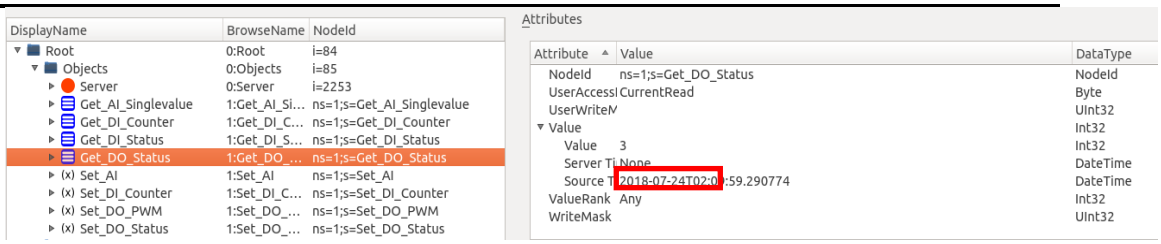
Result : OPC UA server response code

Output Arguments :

Output0 : Set DO status function response.

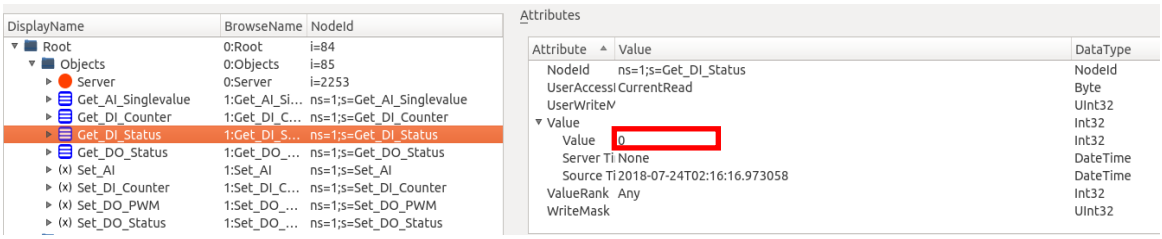
1.4 Get_DO_Status

Click the “Get_DO_Status” item, and you will see the DO status value in the Attributes.



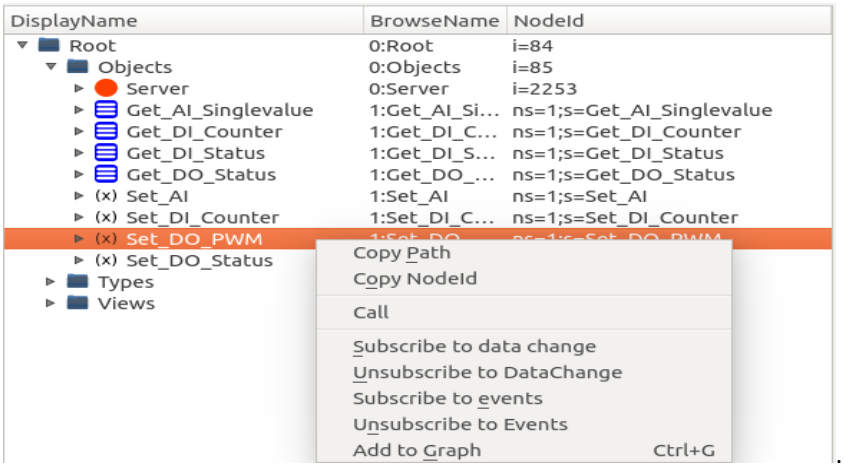
1.5 Get_DI_Status

Click the “Get_DI_Status” item, and you will see the DI status value in the Attributes.

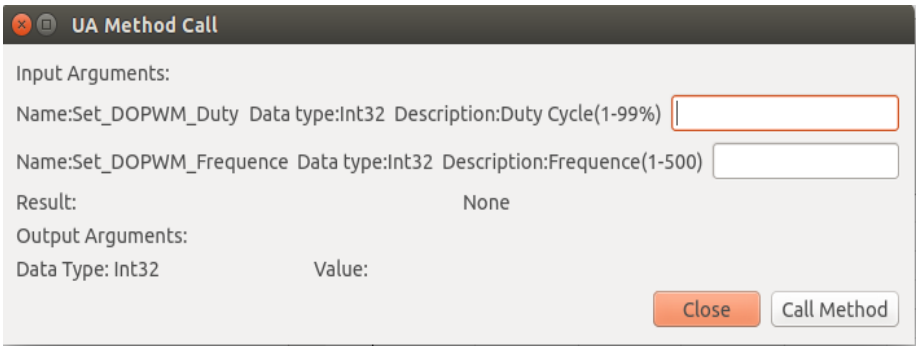


1.6 Set_DO_PWM

Right click the “Set_DO_PWM item”.

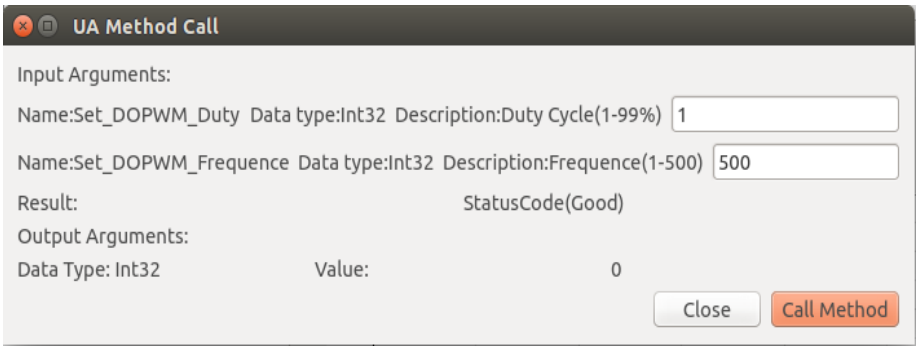


Click “Call”, and you will see the information below.



Set duty cycle and frequence, then click “Call Method”. If successful, you will see

the information below.

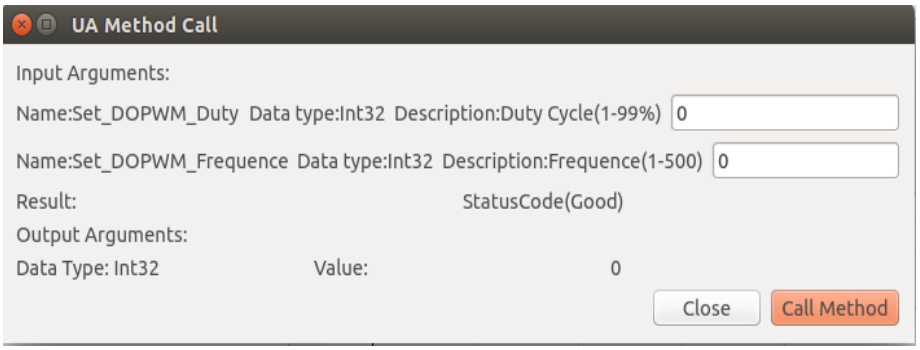


Result : OPC UA server response code

Output Arguments :

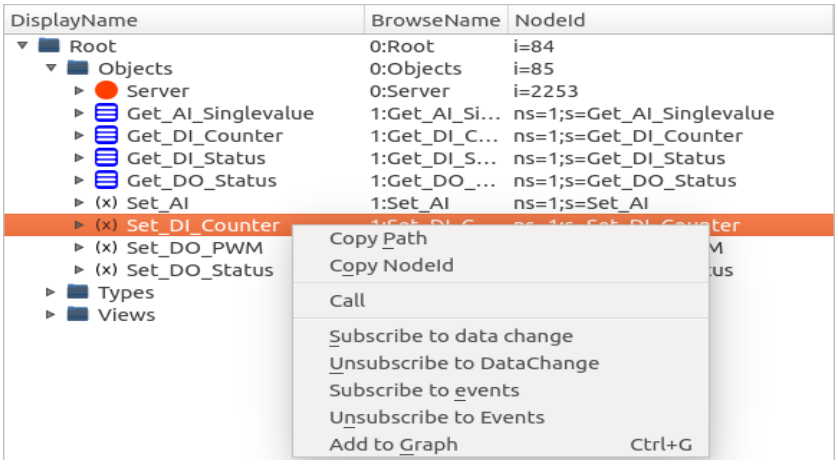
Output0 : Set DO PWM function response.

If you want to stop DO PWM mode, set duty cycle and frequency as 0, then click “Call Method ”. If successful, you will see the information below.

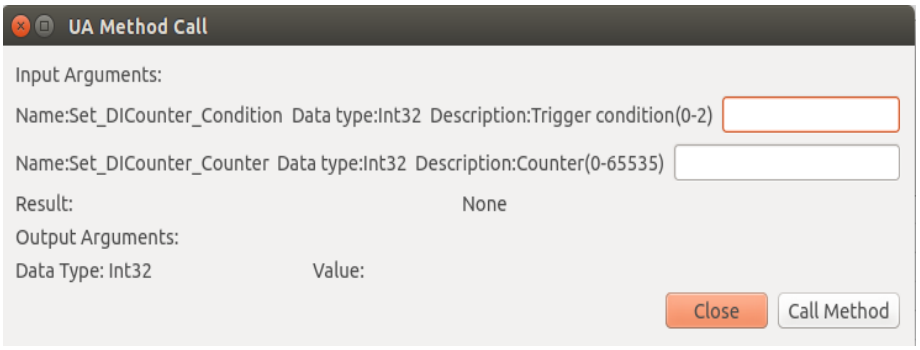


1.7 Set_DI_Counter

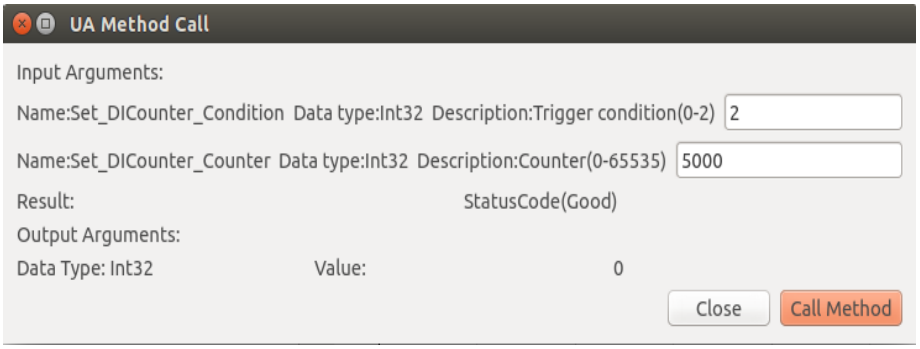
Right click the “Set_DI_Counter” item.



Click “Call”, and you will see the information below.



Set condition and counter number, then click “Call Method”. If successful, you will see the information below.



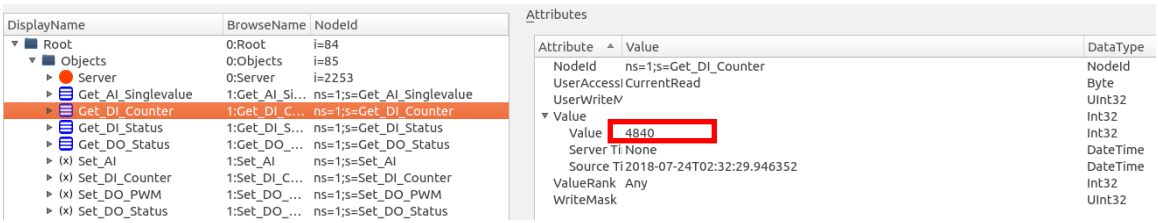
Result : OPC UA server response code

Output Arguments :

Output0 : Set DI counter function response.

1.8 Get_DI_Counter

Click the “Get_DI_Counter” item, and you will see the DI counter value in the Attributes.



APPENDIX A
Error Code

Error Code List

Error Code	Error Name	Description
0x00000000	AXIO_OK	Success
0xE0000001	AXIO_ERR_HANDLE	An invalid handle
0xE0000002	AXIO_ERR_CMD	A command operation failure
0xE0000003	AXIO_ERR_PARAMETERS	Incorrect input parameters
0xE0000004	AXIO_ERR_NOT_SUPPORTED	The feature is not supported
0xE0000005	AXIO_ERR_RESPN_TIMEOUT	The command response is timeout
0xE0000006	AXIO_ERR_RESPN_MCU	An error response from MCU