

## How to use KEPServerEX OPC Server (Kepware) with ioLogik 4000 (Modbus TCP/IP NA-4010 and Modbus Serial NA-4020/NA-4021)

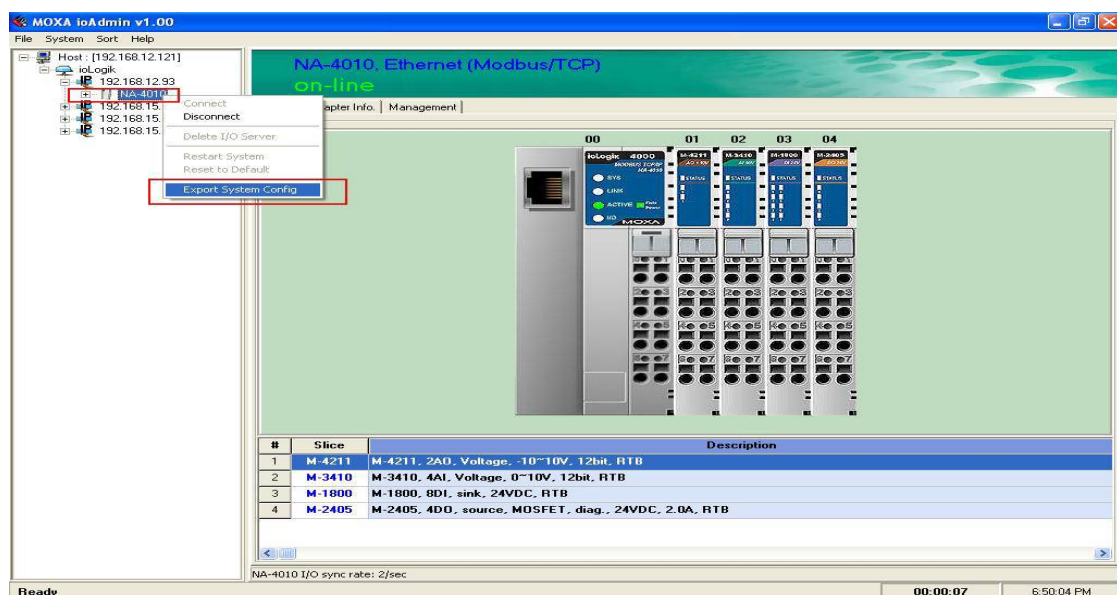
*Alex Chen, Senior Engineer, Moxa Technical Support Dept.*

In this Technical Note, we cover the following topics:

1. How to export the ioLogik 4000 Modbus address table
2. How to use KEPServerEX OPC Server (Kepware) communication with NA-4010
3. How to use KEPServerEX OPC Server (Kepware) communication with NA-4020 and NA-4021

### 1. How to export the ioLogik 4000 Modbus address table

- 1.1 Run ioAdmin by clicking **Start → Program Files → ioLogik → Utility → ioAdmin**. Select the ioLogik4000 whose address table you wish to export, and then press the right mouse button. Next, select **Export System Config** to save the configuration file.



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The MOXA Group manufactures one of the world's leading brands of device networking solutions. Products include serial boards, USB-to-serial Hubs, media converters, device servers, embedded computers, Ethernet I/O servers, terminal servers, Modbus gateways, industrial switches, and Ethernet-to-fiber converters. Our products are key components of many networking applications, including industrial automation, manufacturing, POS, and medical treatment facilities.

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## MOXA Tech Note How to use KEPServerEX OPC Server (Kepware)

- 1.2 Open the saved configuration file and retrieve the ioLogik4000's slice model name, sequence, and Modbus address table using the information tables presented below:

```
ik4000e.txt - Notepad
File Edit Format View Help
ioLogik 4000 Network I/O Server Configuration
Date: 1/20/2006
Time: 10:03:41 AM

1. Slice models
-----
Slot No. Description
00 NA-4010, ioLogik 4000 Ethernet network adapter
01 M-4211, 2AO, Voltage, -10-10V, 12bit, RTB
02 M-3410, 4AI, Voltage, 0-10V, 12bit, RTB
03 M-1800, 8DI, Sink, 24VDC, RTB
04 M-2400, 4DO, Sink, MOSFET, 24VDC, 0.5A, RTB

2. Slice configurations
-----
00 NA-4010 IP=192.168.12.93,NM=255.255.255.0,GW=192.168.12.254,MAC=00-90-E8-0B-70-02
01 M-4211 Watchdog-Disable
01 M-4211 Ch01: Safe mode=Safe Value(0x0000)
02 M-3410 -n/a-
03 M-1800 -n/a-
04 M-2400 Ch00: Safe mode=Safe Status(OFF)
04 M-2400 Ch01: Safe mode=Safe Status(OFF)
04 M-2400 Ch02: Safe mode=Safe Status(OFF)
04 M-2400 Ch03: Safe mode=Safe Status(OFF)

3. Modbus address table
-----
Slot No. Channel No. I/O type Modbus Address (WORD) Modbus Address (BIT) I/O Data Length(bits)
01 00 Output 0x0800/0x00 0x1000 0x0010
01 01 Output 0x0801/0x00 0x1010 0x0010
02 00 Input 0x0000/0x00 0x0000 0x0010
02 01 Input 0x0001/0x00 0x0010 0x0010
02 02 Input 0x0002/0x00 0x0020 0x0010
02 03 Input 0x0003/0x00 0x0030 0x0010
03 00 Input 0x0004/0x00 0x0040 0x0001
03 01 Input 0x0004/0x01 0x0041 0x0001
03 02 Input 0x0004/0x02 0x0042 0x0001
03 03 Input 0x0004/0x03 0x0043 0x0001
03 04 Input 0x0004/0x04 0x0044 0x0001
03 05 Input 0x0004/0x05 0x0045 0x0001
03 06 Input 0x0004/0x06 0x0046 0x0001
03 07 Input 0x0004/0x07 0x0047 0x0001
04 00 Output 0x0802/0x00 0x1020 0x0001
04 01 Output 0x0802/0x01 0x1021 0x0001
04 02 Output 0x0802/0x02 0x1022 0x0001
04 03 Output 0x0802/0x03 0x1023 0x0001

<END>
```

### (1) Slice Models

Slot No.	Description
00	NA-4010, ioLogik 4000 Ethernet network adapter
01	<b>M-4211, 2 AO</b> , Voltage, -10 to 10V, 12-bit, RTB
02	<b>M-3410, 4 AI</b> , Voltage, 0 to 10V, 12-bit, RTB
03	<b>M-1800, 8 DI</b> , Sink, 24 VDC, RTB
04	<b>M-2400, 4 DO</b> , Sink, MOSFET, 24 VDC, 0.5A, RTB

### (2) Modbus address table

Slot No.	Channel No.	I/O type	Modbus Address (WORD)	Modbus Address (BIT)	I/O Data Length(bits)
01	00	<b>Output</b>	<b>0x0800/0x00</b>	0x1000	0x0010
01	01	Output	0x0801/0x00	0x1010	0x0010
02	00	<b>Input</b>	<b>0x0000/0x00</b>	0x0000	0x0010
02	01	Input	0x0001/0x00	0x0010	0x0010
02	02	Input	0x0002/0x00	0x0020	0x0010
02	03	Input	0x0003/0x00	0x0030	0x0010
03	00	<b>Input</b>	0x0004/0x00	<b>0x0040</b>	0x0001
03	01	Input	0x0004/0x01	0x0041	0x0001
03	02	Input	0x0004/0x02	0x0042	0x0001
03	03	Input	0x0004/0x03	0x0043	0x0001
03	04	Input	0x0004/0x04	0x0044	0x0001
03	05	Input	0x0004/0x05	0x0045	0x0001
03	06	Input	0x0004/0x06	0x0046	0x0001
03	07	Input	0x0004/0x07	0x0047	0x0001
04	00	<b>Output</b>	0x0802/0x00	<b>0x1020</b>	0x0001

04	01	Output	0x0802/0x01	0x1021	0x0001
04	02	Output	0x0802/0x02	0x1022	0x0001
04	03	Output	0x0802/0x03	0x1023	0x0001

1.3 The information can be summarized as follows:

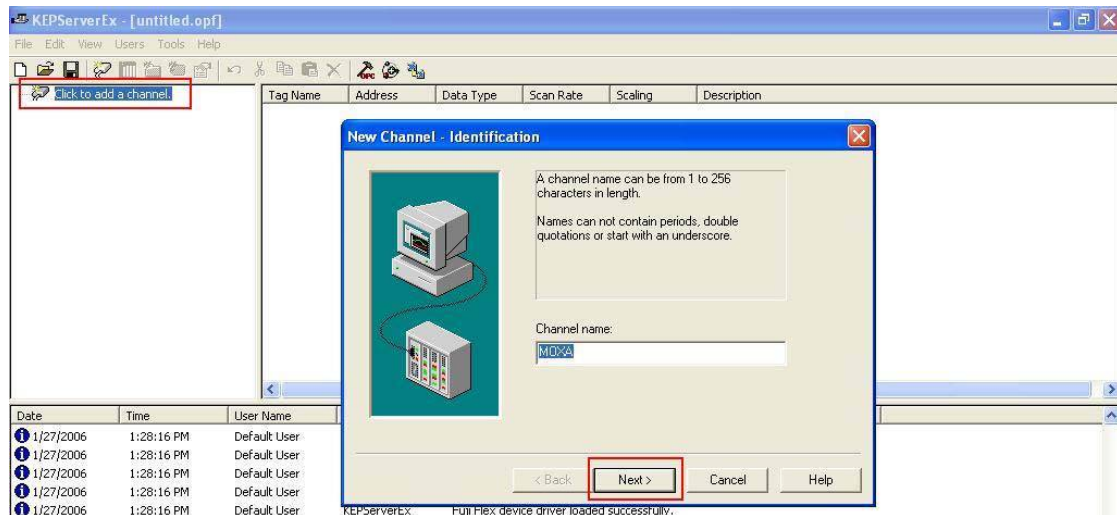
- Slice 1:    M4211 (2 channel Analog Output)  
              Modbus address(word) 0x0800=2048(Decimal)
- Slice 2:    M3410 (4 channel Analog Input)  
              Modbus address(word) 0x0000=0000(Decimal)
- Slice 3:    M1800 (8 channel Digital Input)  
              Modbus address(bit) 0x0040=0064(Decimal)
- Slice 4:    M2400 (4 channel Digital Output)  
              Modbus address(bit) 0x1020=4128(Decimal)

In the Modbus Memory Map, you need to use different Address Formats to query the different slice models. For example: to Query the Digital Input, you need to use 10065 to get the status of M1800's channel 0. To get the Analog Input, you must use 30001. You will then get the M3410 channel 0 value. The different address formats are presented in the following table:

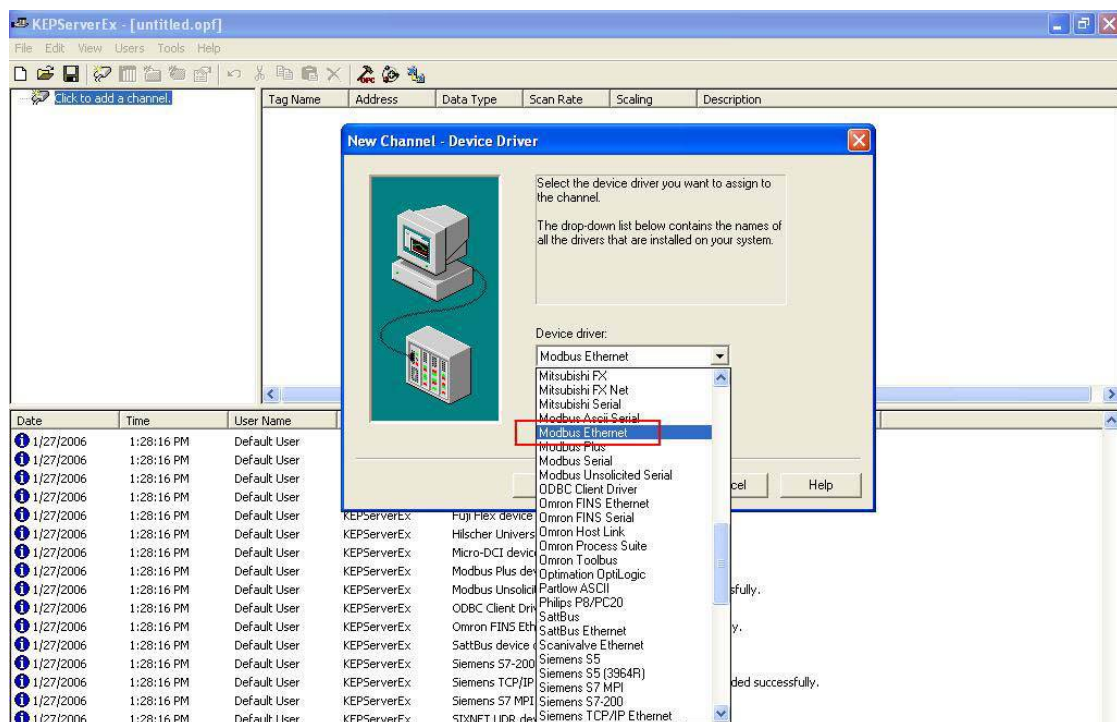
Modbus Data Type	Common Name	Read/Write Behavior	Address Format
Digital Outputs	Bits, binary values, flags	Single bit, alterable by an application program, read-write	00001 09999
Digital Inputs	Binary inputs	Single bit, provided by an I/O system, read-only	10001 19999
Analog Inputs	Analog inputs	16-bit quantity, provided by an I/O system, read-only	30001 39999
Analog Outputs	Analog values, variables, Registers	16-bit quantity, alterable by an application program, read-write	40001 49999

### 2. How to use KEPServerEX OPC Server (Kepware) communication with NA-4010

2.1 Run the KEPServerEX OPC Server to add a new channel and then click **Next**.

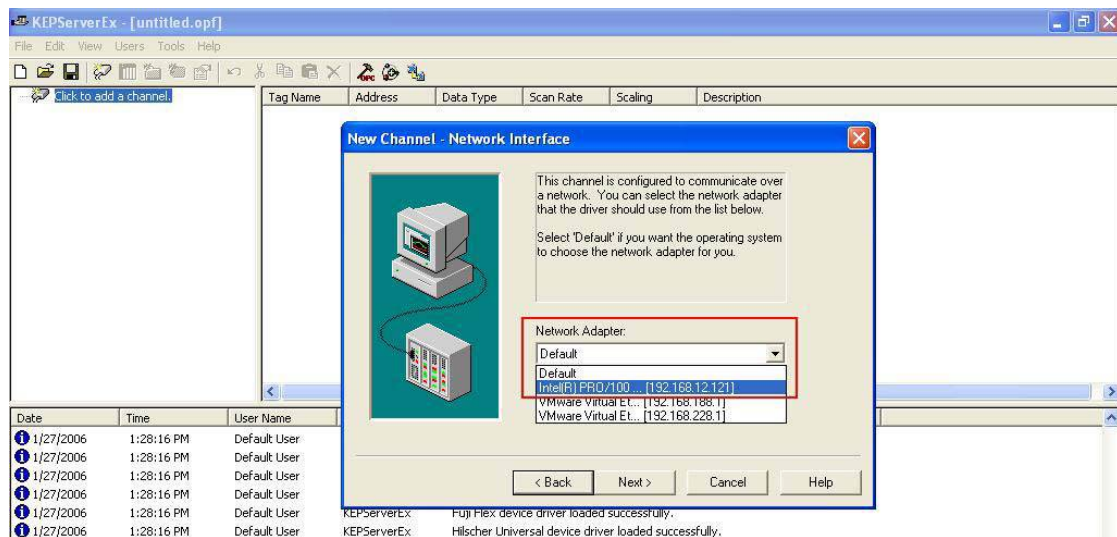


2.2 Select the **Device driver (Modbus Ethernet)** that you want to assign to the channel and then click **Next**.

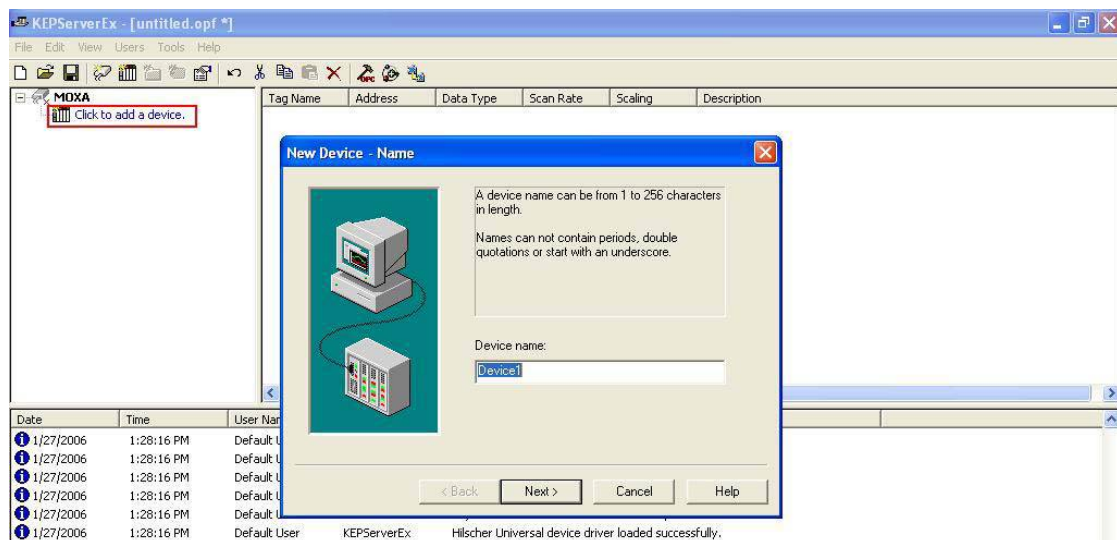


## MOXA Tech Note    How to use KEPServerEX OPC Server (Kepware)

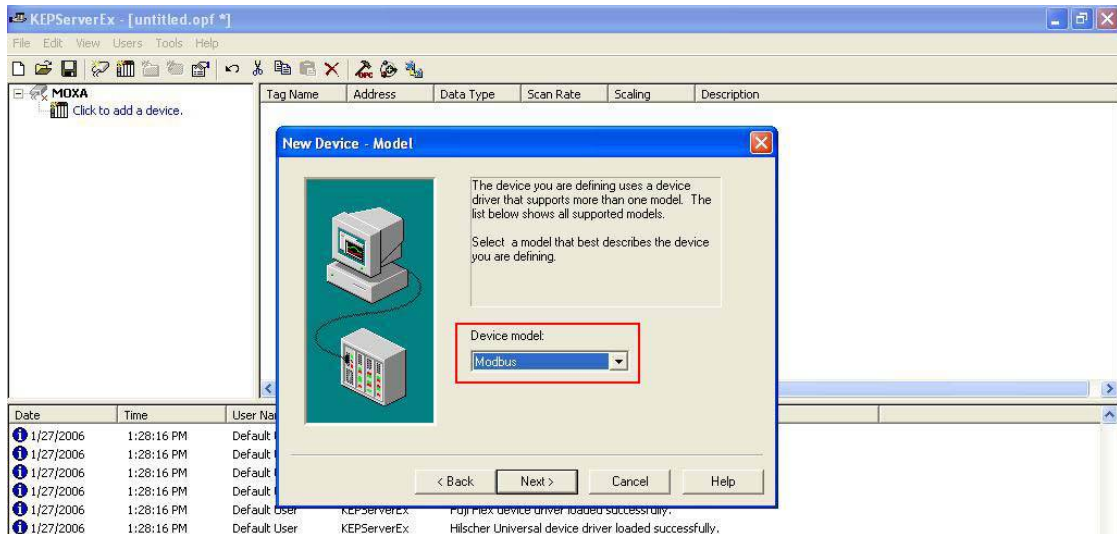
2.3 Select the correct Network Adapter on your Host and then click **Next**.



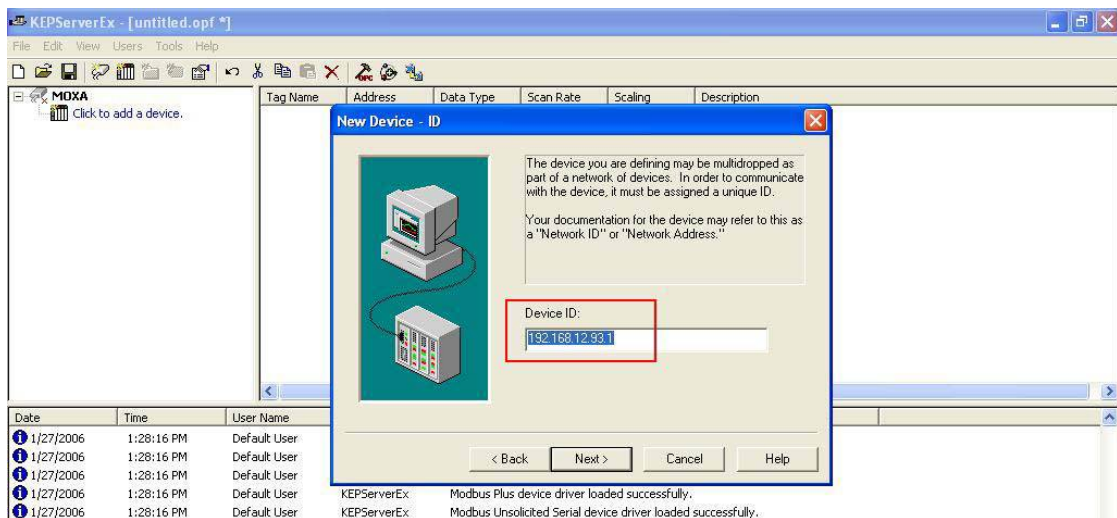
2.4 Add a new Device (Enter the name of the device) and then click **Next**.



2.5 Select the device model (Modbus) and then click **Next**.

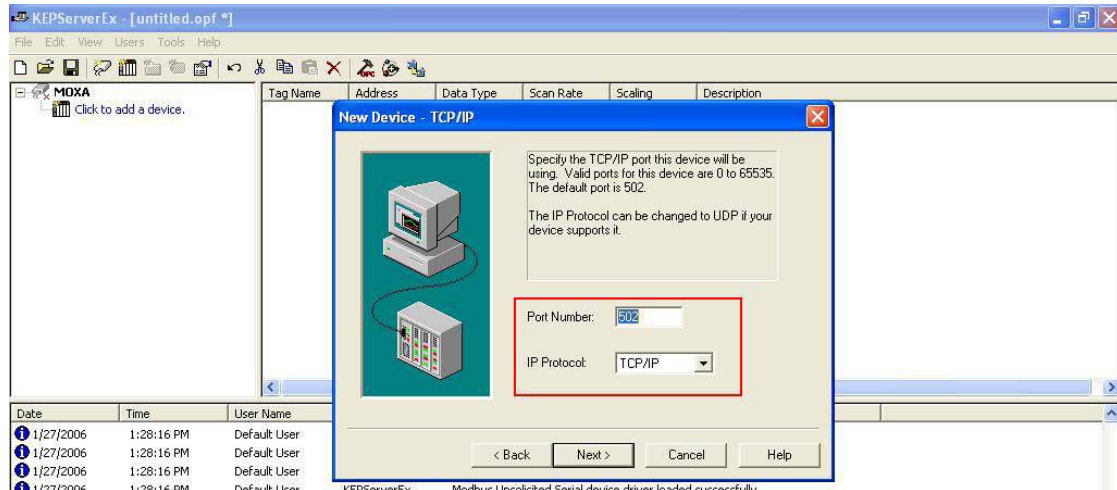


2.6 Define the NA-4010's default IP (192.168.127.254) and use default ID (0) in Device ID field. The entry should look like: **192.168.127.254.0**  
Click **Next** to continue.

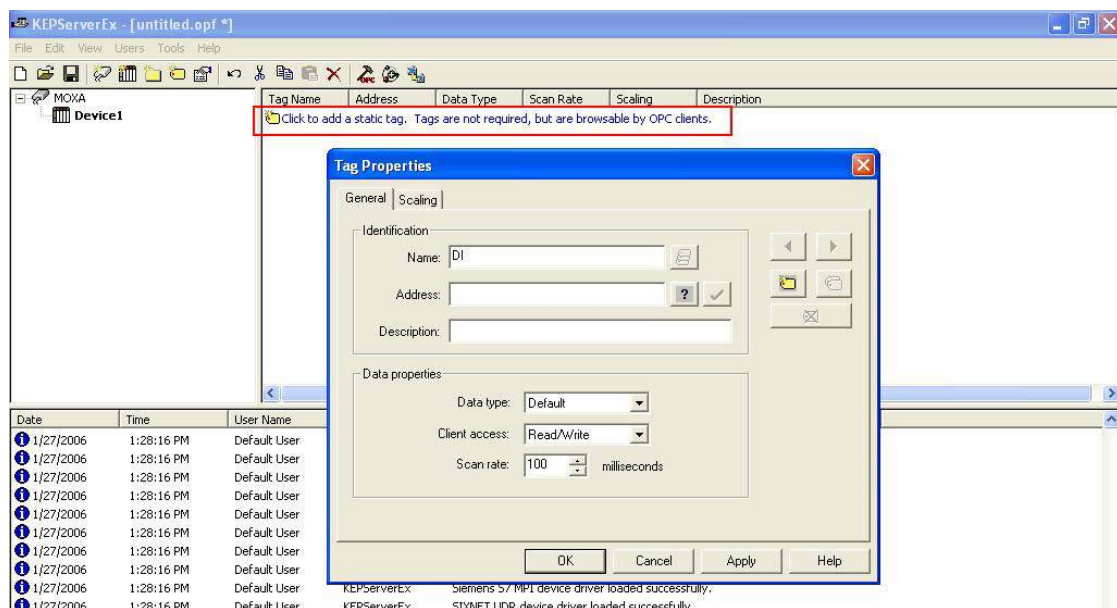




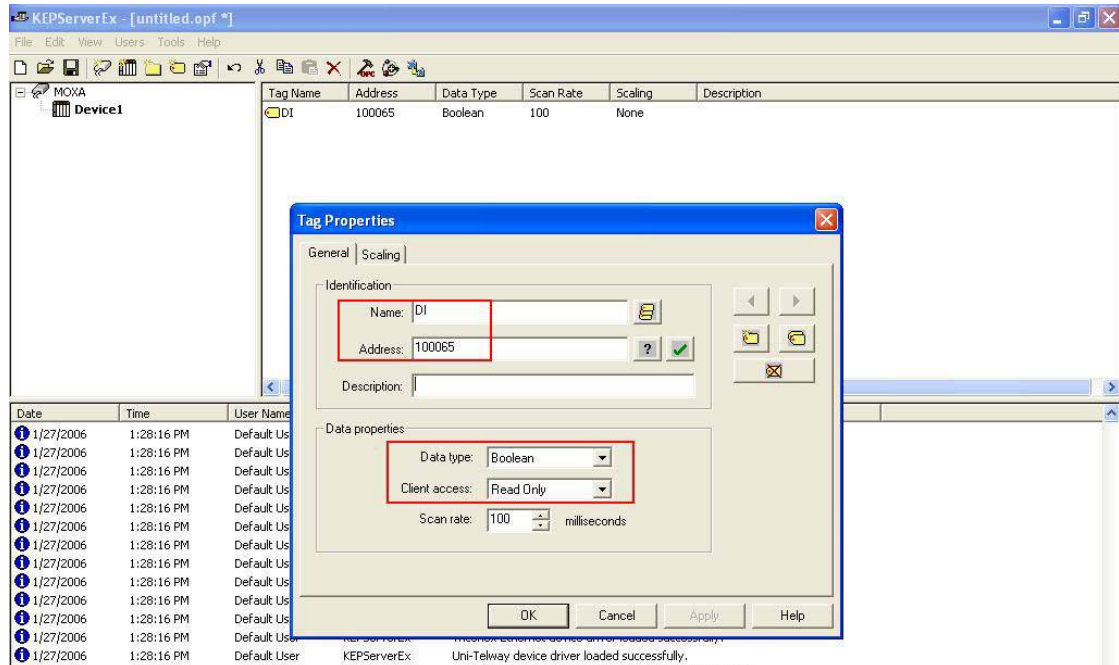
2.7 Setup Modbus TCP port (502), select the IP Protocol as **TCP/IP** and then click **Next**.



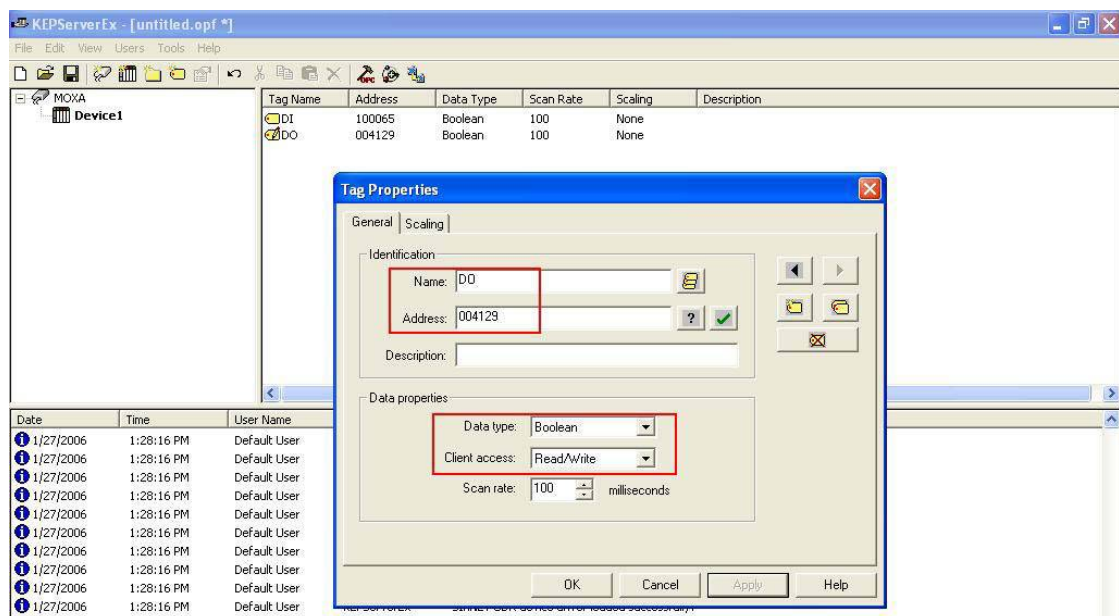
2.8 Click as indicated in the screen below, to add a static Tag for DI, DO, AI and AO modules.



2.9 Define the DI tag (Address = 100065, Data type = Boolean, Client Address = Read only) and then click **Apply** to apply the changes.

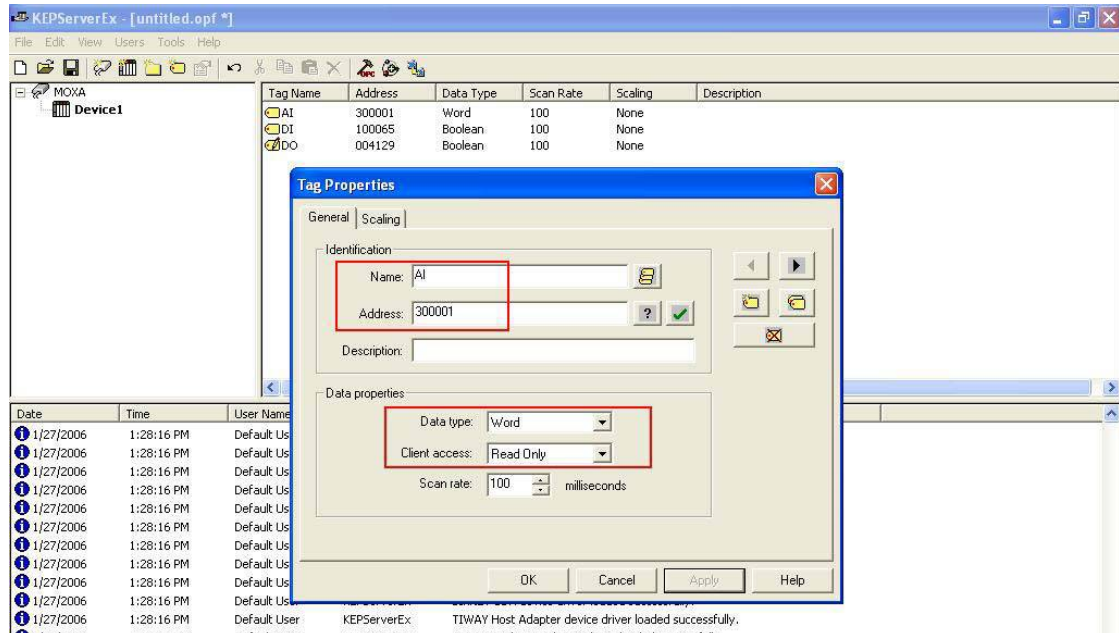


2.10 Define the DO tag (Address = 0004129, Data type = Boolean, Client Address = Read /Write) and then click **Apply** to apply the changes.

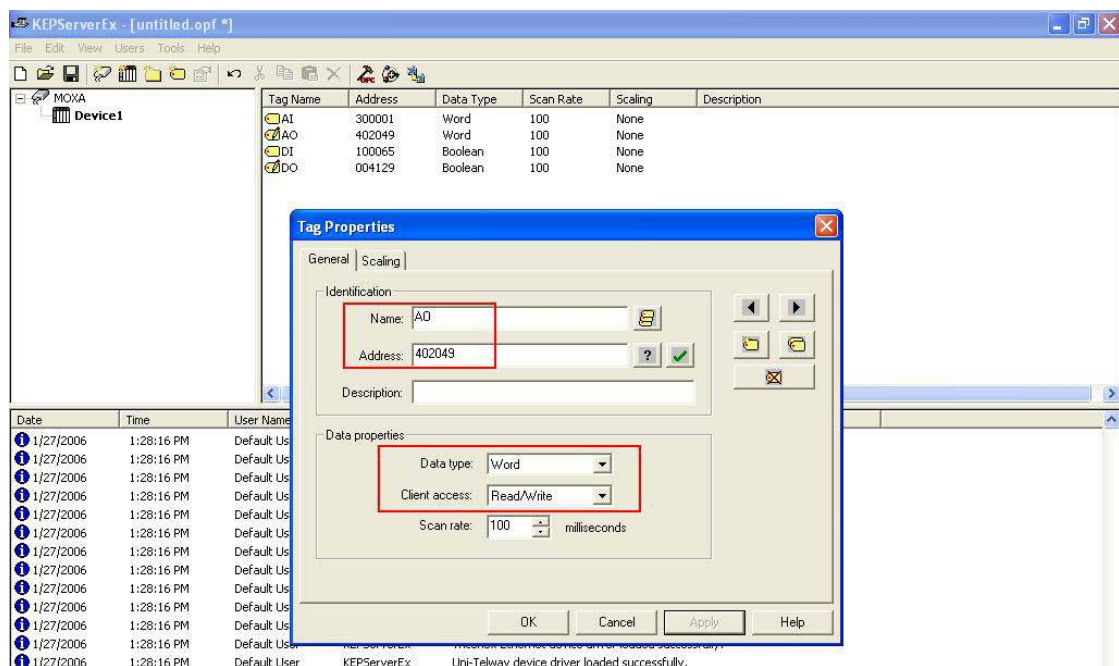




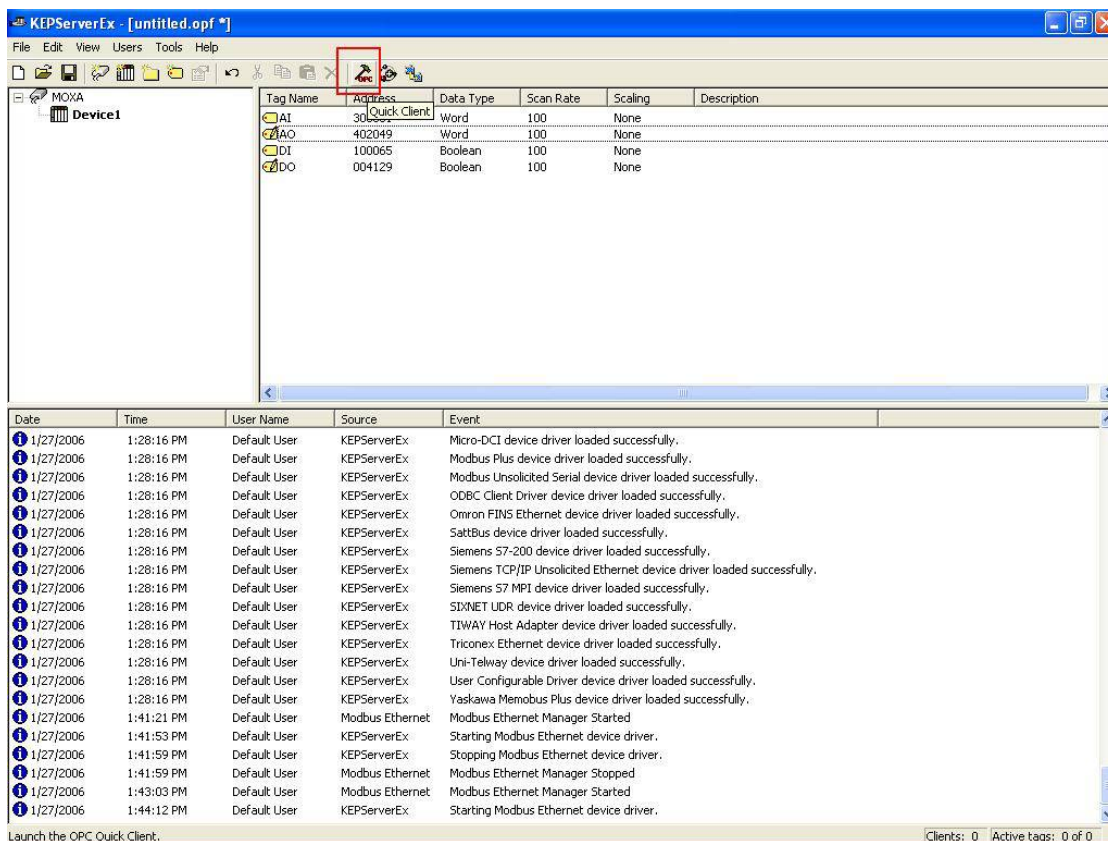
2.11 Define the AI tag (Address = 300001, Data type = Word, Client Address = Read only) and then click **Apply** to apply the changes.



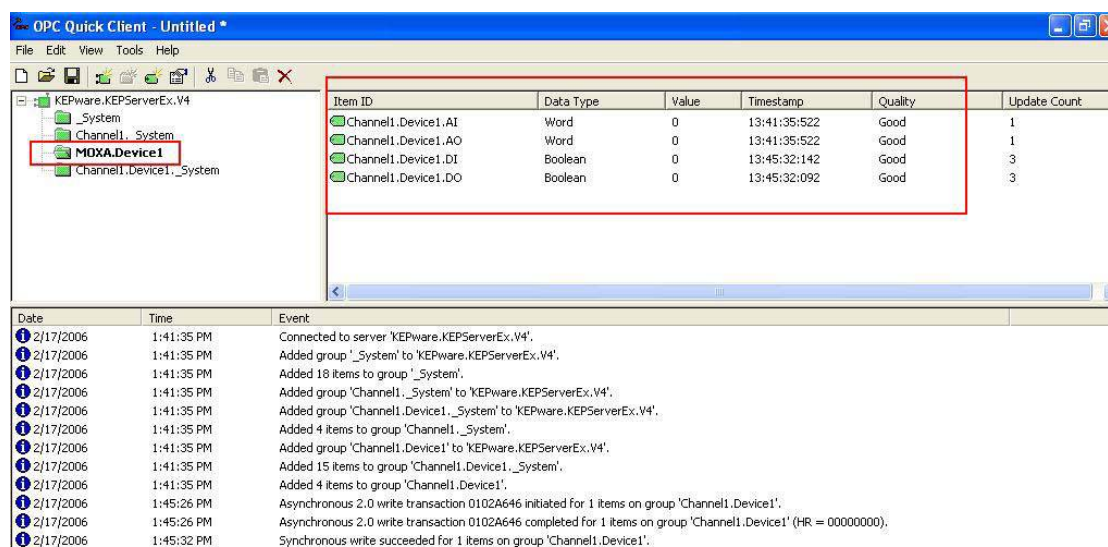
2.12 Define the AO tag (Address = 402049, Data type = Word, Client Address = Read /Write) and then click **Apply** to apply the changes. Finally, click **OK** to close the Tag Properties screen.



2.13 Then, click the Quick Client icon as shown below, to monitor all your configurations and values.



2.14 Select your Devices and view all DI, DO, AI, AO Value and Quality settings.



## MOXA Tech Note How to use KEPServerEX OPC Server (Kepware)

- 2.15 If you want to test the DO or AO values, select the desired DO or AO item and right click it. Next, select the Asynchronous 2.0 Write option and set the DO or AO values.

The image shows two screenshots of the OPC Quick Client software interface, demonstrating how to write to a DO item.

**Top Screenshot:** The main window displays a tree view on the left with 'MOXA.Device1' selected. The central table lists items: AI, AO, DI, and DO. The 'DO' item is selected, and a right-click context menu is open, showing the 'Asynchronous 2.0 Write...' option highlighted.

Tag Name	Address	Data Type	Scan Rate	Scaling	Description
AI	300001	Word	100	None	
AO	402049	Word	100	None	
DI	100065	Boolean	100	None	
DO	004129	Boolean	100	None	

Item ID	Data Type	Value	Timestamp	Quality	Update Count
MOXA.Device1.AI	Word	0	13:55:14:518	Good	5
MOXA.Device1.AO	Word	0	13:55:14:478	Good	2
MOXA.Device1.DI	Boolean	0	13:56:42:535	Good	2
MOXA.Device1.DO	Boolean	0			

**Bottom Screenshot:** The main window shows the 'Channel1.Device1' tree view. The 'DO' item is selected. An 'Asynchronous 2.0 Write' dialog box is open, showing the 'Write Value' field set to '1'.

Item ID	Data Type	Value	Timestamp	Quality	Update Count
Channel1.Device1.AI	Word	0	13:41:35:522	Good	1
Channel1.Device1.AO	Word	0	13:41:35:522	Good	1
Channel1.Device1.DI	Boolean	0	14:06:49:589	Good	7
Channel1.Device1.DO	Boolean	0	14:08:00:170	Good	5

Date	Time	Event
2/17/2006	1:41:35 PM	Connecte
2/17/2006	1:41:35 PM	Added gro
2/17/2006	1:41:35 PM	Added 18
2/17/2006	1:41:35 PM	Added gro
2/17/2006	1:41:35 PM	Added 4
2/17/2006	1:41:35 PM	Added 15
2/17/2006	1:41:35 PM	Added 4
2/17/2006	1:45:26 PM	Asynchro
2/17/2006	1:45:26 PM	Asynchronous 2.0 write transaction 0102A645 completed for 1 items on group 'Channel1.Device1' (HR = 00000000).
2/17/2006	1:45:32 PM	Synchronous write succeeded for 1 items on group 'Channel1.Device1'.
2/17/2006	2:06:36 PM	Asynchronous 2.0 write transaction 01160468 initiated for 1 items on group 'MOXA.Device1'.
2/17/2006	2:06:36 PM	Asynchronous 2.0 write transaction 01160468 completed for 1 items on group 'MOXA.Device1' (HR = 00000000).
2/17/2006	2:08:00 PM	Asynchronous 2.0 write transaction 01174EB2 initiated for 1 items on group 'MOXA.Device1'.
2/17/2006	2:08:00 PM	Asynchronous 2.0 write transaction 01174EB2 completed for 1 items on group 'MOXA.Device1' (HR = 00000000).

2.16 The DO value is then changed to the value you specified.

The screenshot displays the OPC Quick Client interface. The left pane shows the project tree with the following structure:

- KEPware.KEPServerEx.V4
  - \_System
    - Channel1.\_System
      - MOXA.Device1
        - Channel1.Device1.\_System

The main pane shows a table of items:

Item ID	Data Type	Value	Timestamp	Quality	Update Count
Channel1.Device1.AI	Word	0	13:41:35:522	Good	1
Channel1.Device1.AO	Word	0	13:41:35:522	Good	1
Channel1.Device1.DI	Boolean	0	14:06:49:589	Good	7
Channel1.Device1.DO	Boolean	1	14:06:35:619	Good	4

The 'Channel1.Device1.DO' row is highlighted with a red rectangle. The bottom pane shows the event log with the following entries:

Date	Time	Event
2/17/2006	1:41:35 PM	Connected to server 'KEPware.KEPServerEx.V4'.
2/17/2006	1:41:35 PM	Added group '_System' to 'KEPware.KEPServerEx.V4'.
2/17/2006	1:41:35 PM	Added 18 items to group '_System'.
2/17/2006	1:41:35 PM	Added group 'Channel1._System' to 'KEPware.KEPServerEx.V4'.
2/17/2006	1:41:35 PM	Added 4 items to group 'Channel1._System'.
2/17/2006	1:41:35 PM	Added group 'Channel1.Device1' to 'KEPware.KEPServerEx.V4'.
2/17/2006	1:41:35 PM	Added 15 items to group 'Channel1.Device1._System'.
2/17/2006	1:41:35 PM	Added 4 items to group 'Channel1.Device1'.
2/17/2006	1:45:26 PM	Asynchronous 2.0 write transaction 0102A646 initiated for 1 items on group 'Channel1.Device1'.
2/17/2006	1:45:26 PM	Asynchronous 2.0 write transaction 0102A646 completed for 1 items on group 'Channel1.Device1' (HR = 00000000).
2/17/2006	1:45:32 PM	Synchronous write succeeded for 1 items on group 'Channel1.Device1'.
2/17/2006	2:06:36 PM	Asynchronous 2.0 write transaction 01160468 initiated for 1 items on group 'MOXA.Device1'.
2/17/2006	2:06:36 PM	Asynchronous 2.0 write transaction 01160468 completed for 1 items on group 'MOXA.Device1' (HR = 00000000).

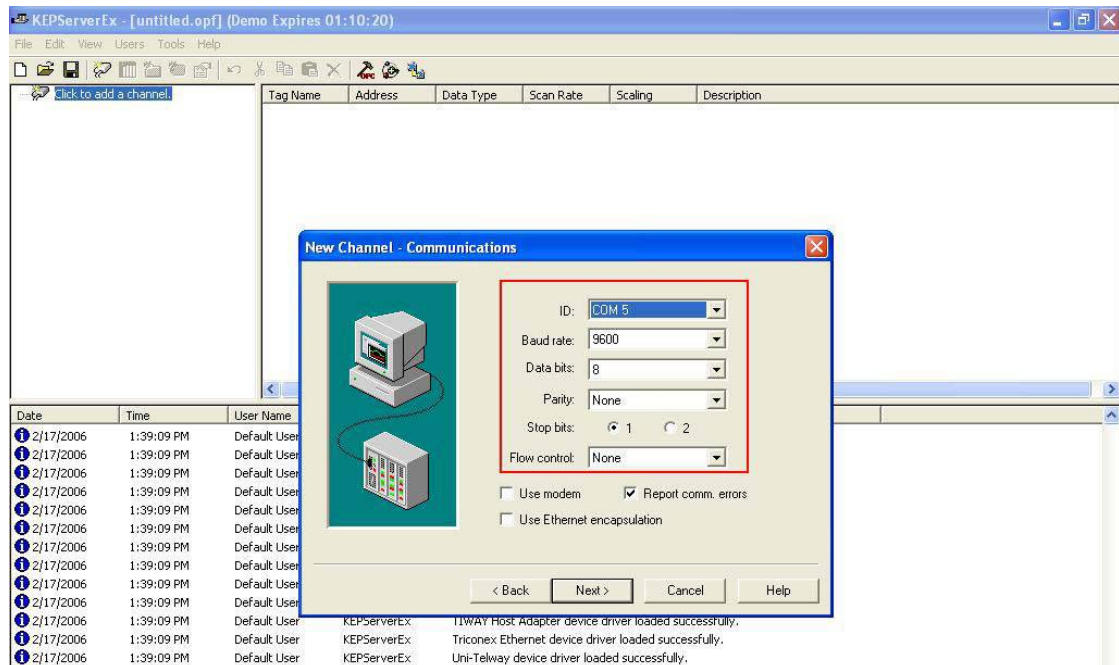
The status bar at the bottom indicates 'Ready' and 'Item Count: 41'.



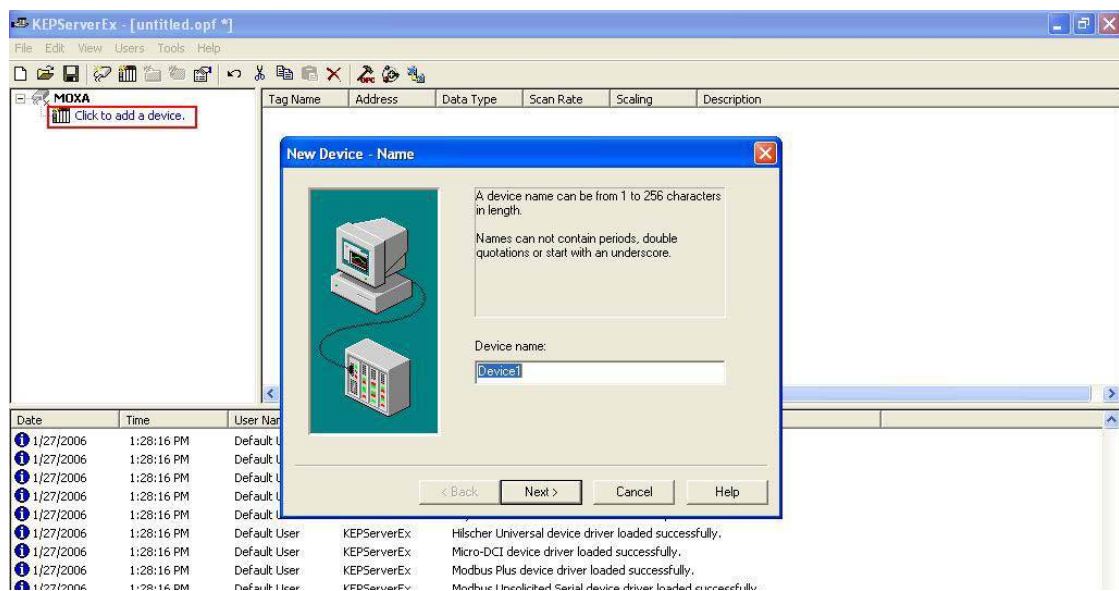




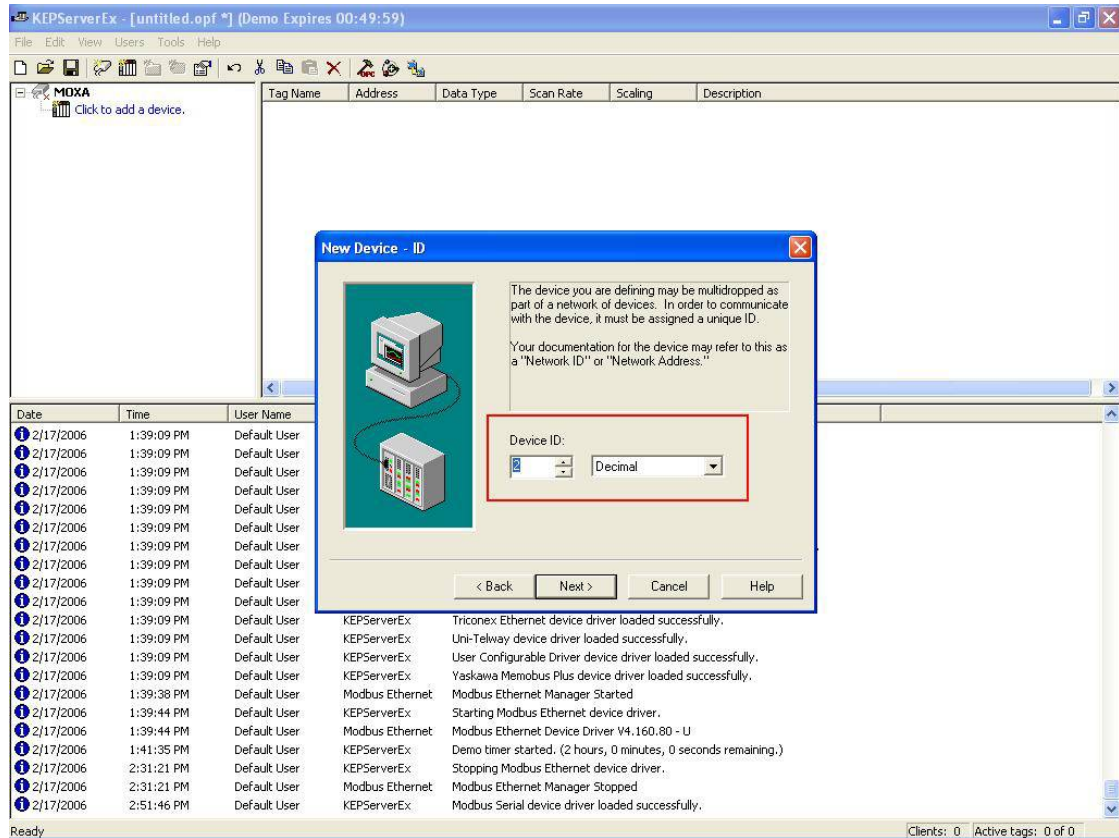
3.3 The current serial parameters will be displayed (ID = COM5, baud rate = 9600, Data bit = 8, Parity = None ). Adjust the NA-4020/NA4021 DIP Switch to match the above serial parameters and then click **Next**.



3.4 Add a new Device. Enter the device name and click **Next**.



3.5 Select the Device ID. It must be the same with the NA-4020/NA-4021 Unit ID. Click **Next** to continue.



3.6 Follow steps 2.8 to 2.16 to complete the tag definition and get a correct result for DI, DO, AI, and AO values.