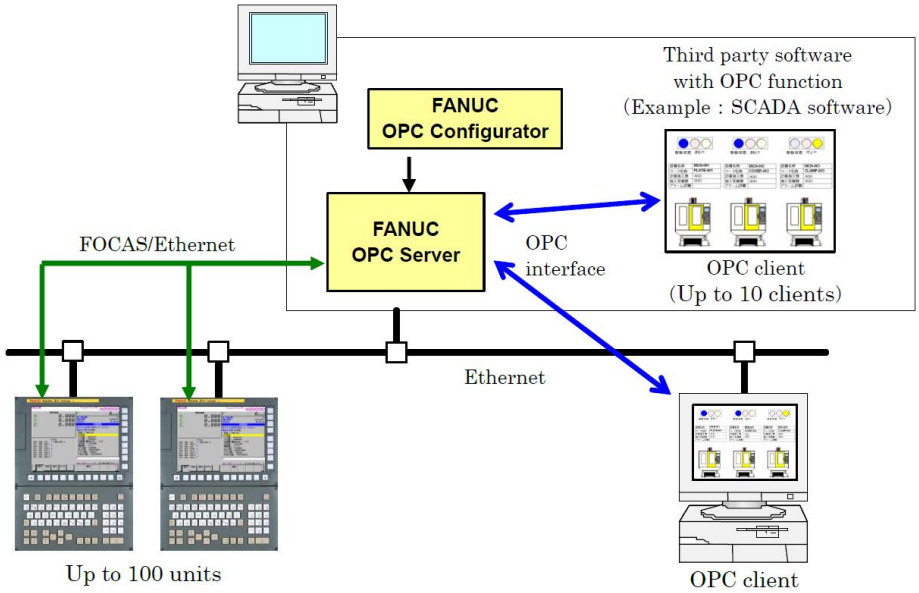
FANUC OPC Server (OPC-UA)

Getting Started



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FANUC

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Revision History

Date	Version	Detail	Paragraph	By
20-November-2019	1.0	Initial Version	All	Y.Karatas
16-November-2020	1.1	Chapter added	4 & 5.1	Y.Karatas

1 Outline

This manual shortly describes the installation and start up procedure of the FANUC OPC Server. No programming skills are needed to configure and use FANUC OPC Server. Up to 100 CNCs and up to 10 OPC clients can be connected to FANUC OPC Server.

2 Introduction to FANUC OPC Server

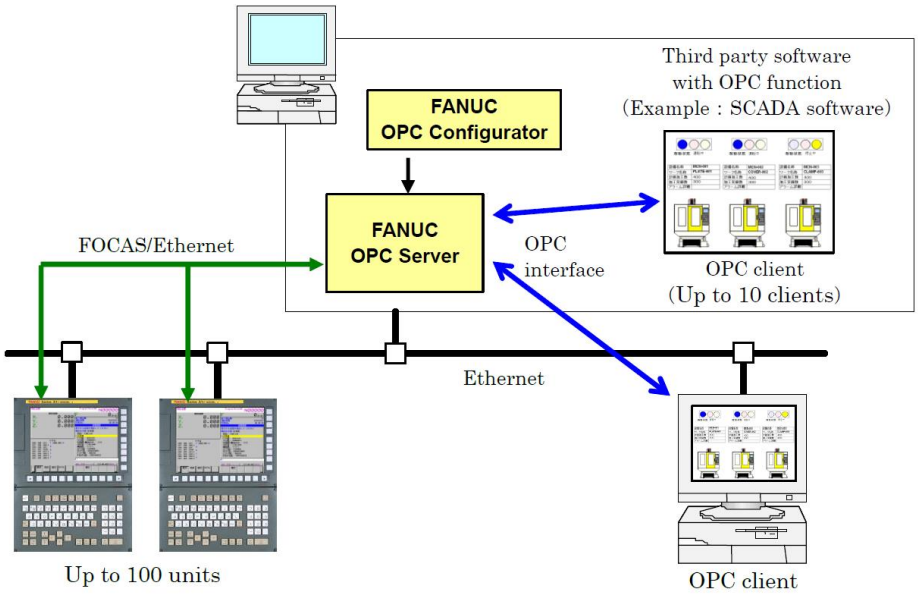


Figure 1: Communication architecture

2.1 Supported CNC

- Series 30i/31i/32i-A
- Series 30i/31i/32i-B
- Series 0i-TD/MD, 0i-TF/MF
- Power Motion i-A
- Series 16i/18i/21i-A/B
- Series 0i-B/C
- PowerMate i-D/H

2.2 Supported CNC data

Maximum 10,000 points can be set with FANUC OPC server. This is a total of all connected CNCs.

- CNC System Information (CNC Series, CNC Type, CNC controlled Axis Count/Path)
- Tool Offsets
- Work Offsets
- Program Data (Main Program Number, Main Program Comment, Active Program Number, Active Program Comment)
- Custom Macro Variable (Local Variable, Common Variable, Embedded Macro Variable, System Variable)
- Alarm Information (Alarm Messages, Alarm Number)
- Axis Name
- Position Information (Absolute Position, Distance to go Position, Machine Position, Relative Position)
- PMC Data (PMC Bit, PMC Byte, PMC 2Byte, PMC 4Byte)
- PMC Alarm (PMC Alarm Messages, PMC Alarm Number)
- Number of Machined Parts
- P-CODE (Control Variable, Variable, Extended Variable)
- Operator Messages
- CNC Status (Mode, Operation, Emergency)

NOTE
The data exchanged to CNC is called “POINT” at OPC Server.
FANUC OPC server supports a maximum of 10,000 points. This is a total of all connected CNCs.

2.3 Hardware Specification

ITEM	*MINIMUM*	*RECOMMENDED*
Processor	Single-core processor, 1.6GHz	Quad-core processor, 2.8GHz
Memory RAM	1GB	4GB
Hard Disk	100MB of free space	100MB of free space
Network	100base-T Ethernet adapter	100base-T Ethernet adapter
Screen resolution	1024 x 768	1280 x 1024
Supported OS	Windows 10 Professional 32 bit /64 bit Windows 8.1 Professional 32 bit / 64 bit Windows 7 Professional 32 bit / 64 bit Windows XP Professional ServicePack 3 32 bit	

NOTE
The minimum update time of points is 100ms. This update time is not a guaranteed value and can vary depending on

- The performance of the PC where OPC Server runs
- Number of connected CNC and OPC clients

3 Installation

3.1 Preparation

1. You need to have administrator rights to install this software.

2. Please close other running programs before installing this software.

3. Please disable the “check for publisher's certificate revocation of digital signature”:
   - Navigate to Windows “Control Panel”
   - Select “Internet Options”
   - Select “Advanced” tab
   - Search for [Check for publisher’s certificate revocation] and unselect this item.

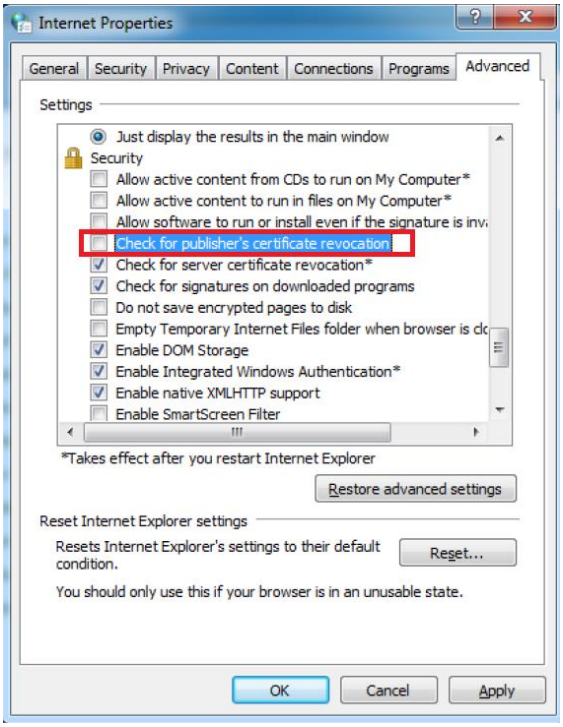
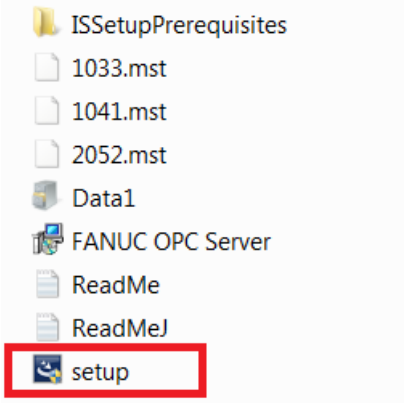


Figure 2: Preparation – Internet Properties

NOTE
On a PC without internet connection, it takes long time to start FANUC OPC Configurator, if the item [Check for publisher's certificate revocation] is selected. Therefore we suggest to unselect it.

3.2 Installation procedure

1. Please insert installation media and navigate to the installation folder.
2. Start "**setup.exe**" to install all FANUC OPC Server components.



3. Installation wizards starts.
4. Please follow the instructions on the screen.
5. Installation is completed when following screen appears:

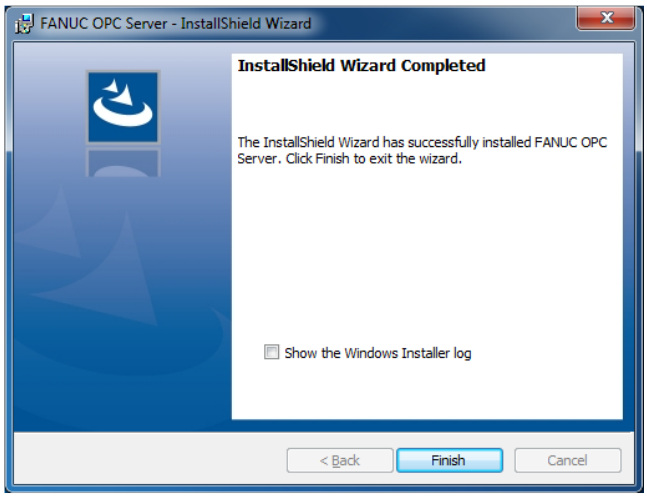
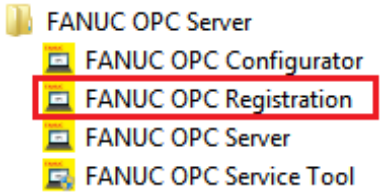


Figure 3: Installation completed

3.3 Registration of serial number

1. Open **FANUC OPC Registration** from Windows Start Menu



2. Enter your serial number and click the [Save] button afterwards.

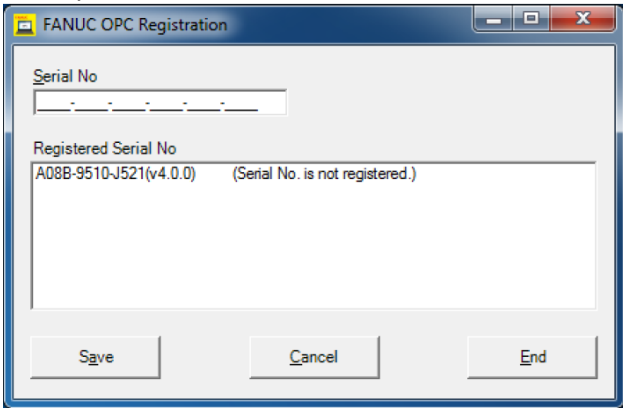


Figure 4: FANUC OPC Registration

NOTE
This is a serial number for an evaluation period of 30 days:
022D-7424-3372-9202-2322-5007

3. If the entered serial number is displayed on the screen, the registration was successful.

3.4 Windows Firewall settings

During installation of FANUC OPC Server components only the [private] profile was applied in the Firewall settings per default. In accordance with the PC of the network environment to be used, please add the profile you want to use.

1. Open Windows Firewall settings
   - Navigate to Windows “Control Panel”
   - Select “Windows Firewall”
   - Select “Advanced Setting”
   - Click on “Inbound Rules”

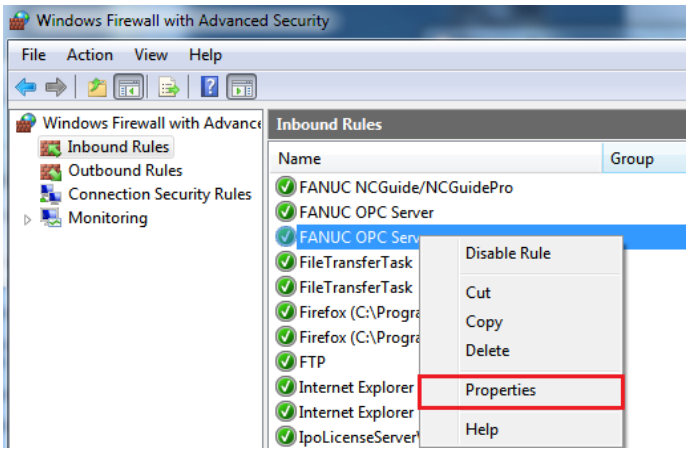


Figure 5: Firewall setting - Inbound Rules

2. Check the profile to be applied in the profile section of Advanced Settings.
   ➔ If you are not sure, select all.

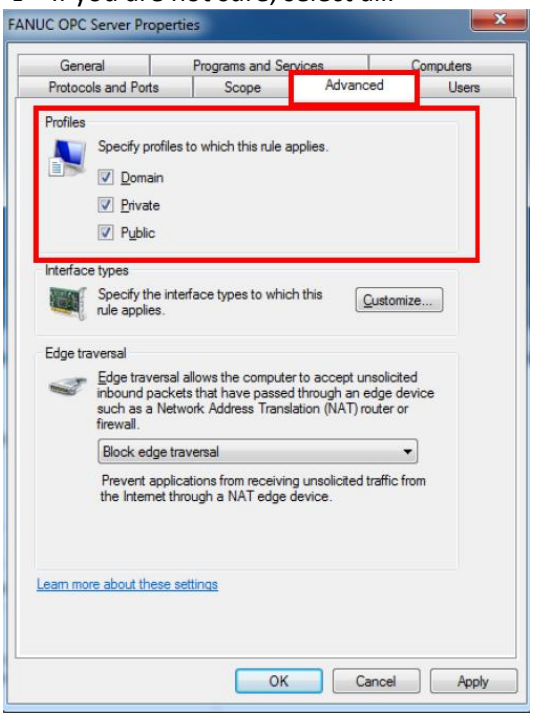


Figure 6: Firewall settings - Select profiles

4 CNC Configuration

Before a FANUC CNC can be connected to FANUC OPC (UA) Server it is necessary to connect your CNC to the same network where your Server-PC is connected.

Clarify following points:

- Depending on the CNC model (31i-B, 30i-A, 18i, 0i-F etc.) there are multiple Ethernet ports available.

  Which port is free and can be used?

  - Embedded Ethernet
  - Fast-Ethernet
  - Multi-Functions Ethernet

- Also there are different types of hardware for each CNC model. The LCD-mounted type (CNC is mounted directly behind the display unit) and the Stand-Alone type (CNC is in the electrical cabinet). Depending on the CNC hardware type the ports are located at a different place in a machine.

  Make sure the Ethernet port can be accessed.

4.1 Usable Ethernet ports on FANUC CNC

Option 1: Embedded Ethernet

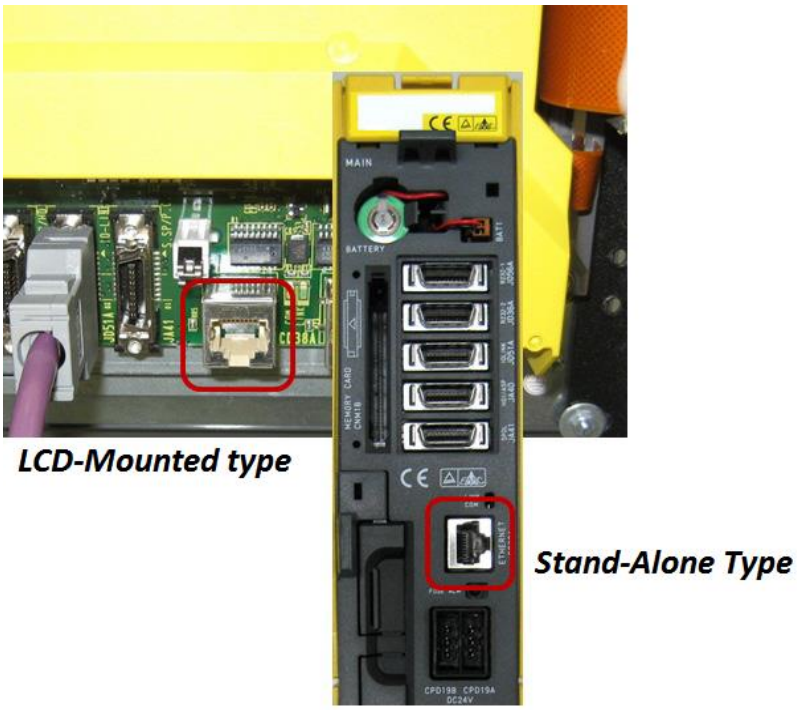


Figure 7: Embedded Ethernet Ports

The Embedded Ethernet board is mounted on the CNC main board. The name of this port is **CD38A.**

Option 2: Fast-Ethernet Board

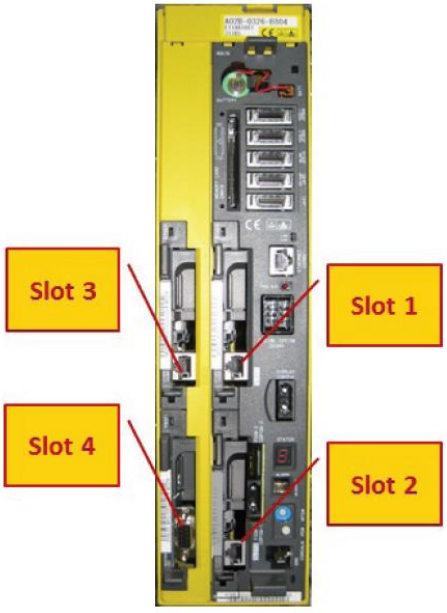


Figure 8: Fast-Ethernet Board

The Fast-Ethernet Board is an optional board that can be inserted in one of the available slots of a FANUC CNC. In case such additional Ethernet board is available it can also be used for the connection of the CNC to the network.

Option 3: Multi-Functions Ethernet (Only available on 3xi-B CNCs)

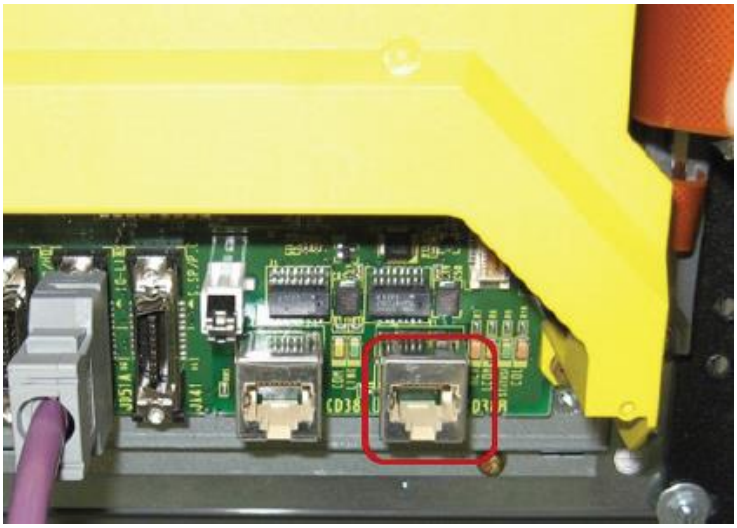


Figure 9: Multi-Functions Ethernet Board

This board is only available on CNCs of the 3xi-B family: 30i-B, 31i-B, 32i-B and 35i-B.

4.2 Ethernet Settings on FANUC CNC

Once the decision for an Ethernet board is made, settings of selected board must be adjusted on the FANUC CNC.

4.2.1 Push the [SYSTEM] button on the MDI

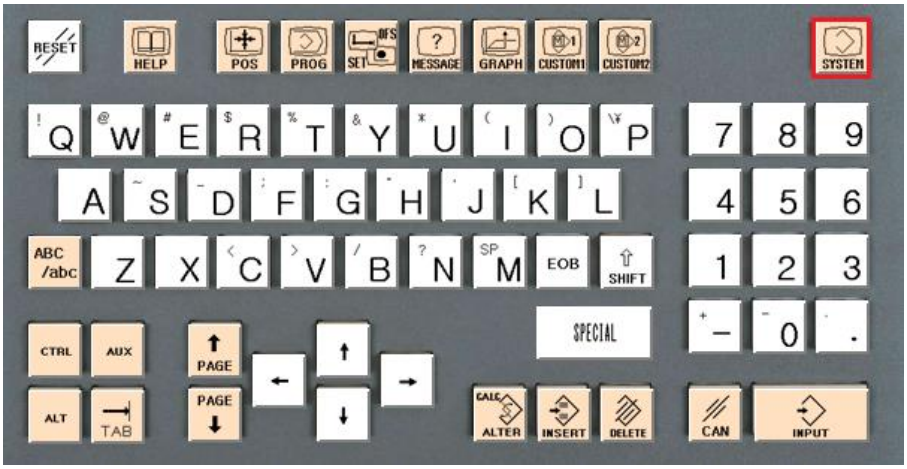


Figure 10: MDI

4.2.2 *Push the [NEXT PAGE] button or [+] button*

In case you have a 15 inch screen:

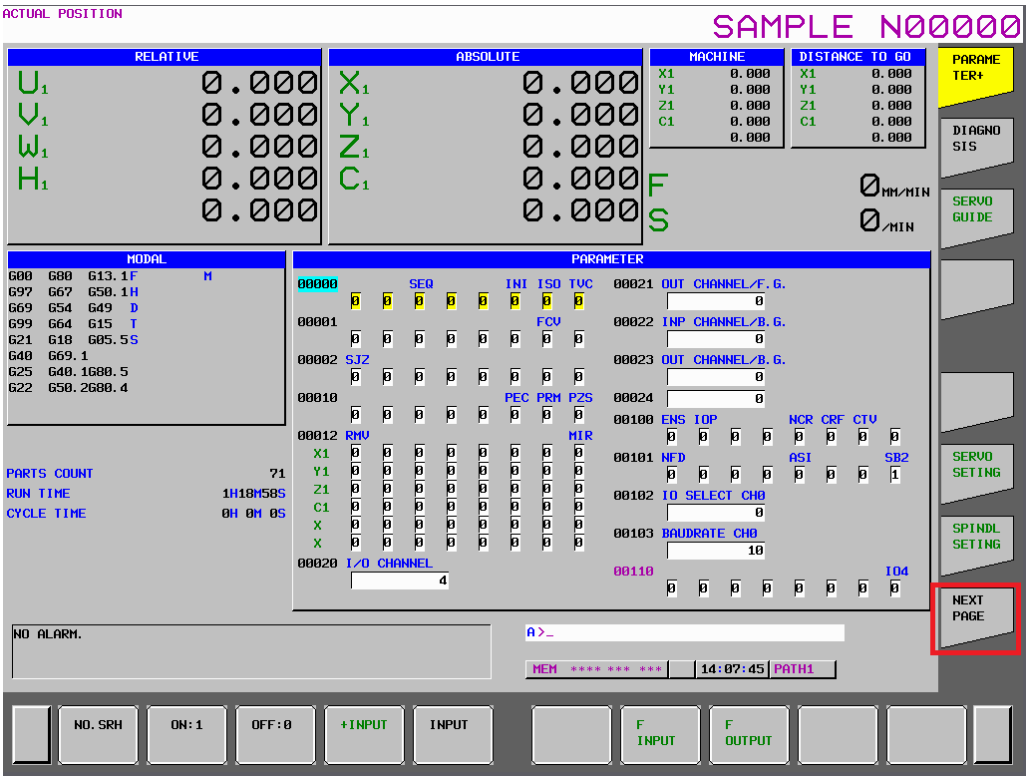


Figure 11: 15 inch Screen - Push Next Page

In case you have a 10.4 inch screen:

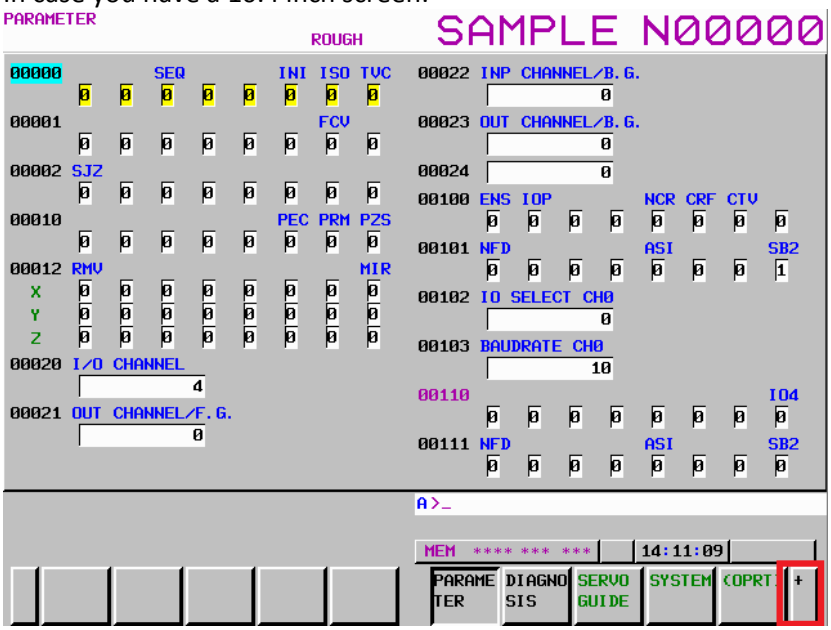


Figure 12: 10.4 inch Screen - Push + button

Please navigate thru the System menu until the Ethernet settings appear in the menu.
Select the Ethernet board you want to use.
Example: **Embedded Ethernet**

4.2.3 Adjust the Ethernet settings

1. Push the “COMMON” button

2. Set IP-address of CNC, Subnet Mask and Router-IP address (if needed)

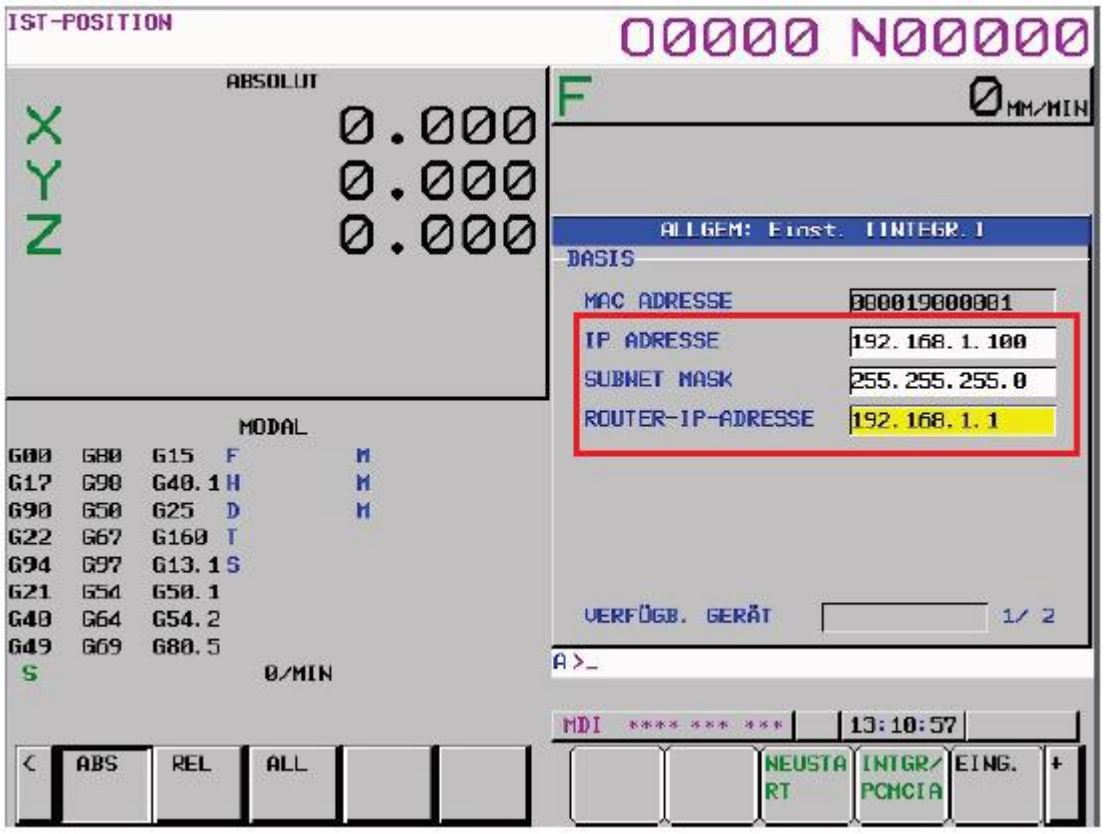
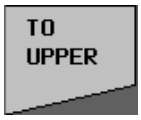


Figure 13: Adjust Ethernet settings

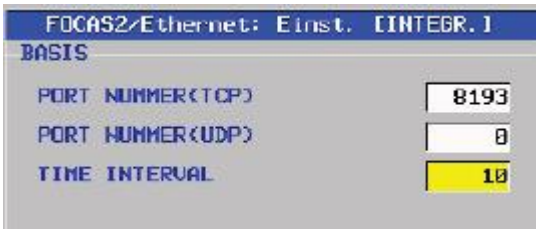
4.2.4 Adjust FOCAS setting

1. Push one of the following buttons to go to upper menu level

10.4 Inch Screen	
15 Inch Screen	

2. Push the “FOCAS2” button

3. Set Port number (TCP) to 8193 and time interval to 10



4.2.5 Restart the Ethernet board

1. Push one of the following buttons to go to upper menu level

10.4 Inch Screen	
15 Inch Screen	

2. Push the “RESTART” button

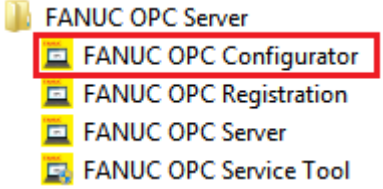
3. Execute Restart by pushing “EXECUTE”

NOTE
In case you are not using Embedded Ethernet board the Ethernet card cannot be restarted while the CNC is running. The control has to be shut off and on again in this case!

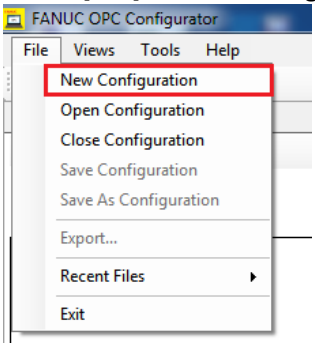
5 OPC-Server Configuration

5.1 New Configuration

1. Select **FANUC OPC Configurator** from Windows Start Menu



2. Select [File] – “New Configuration”



3. Input Configuration Settings

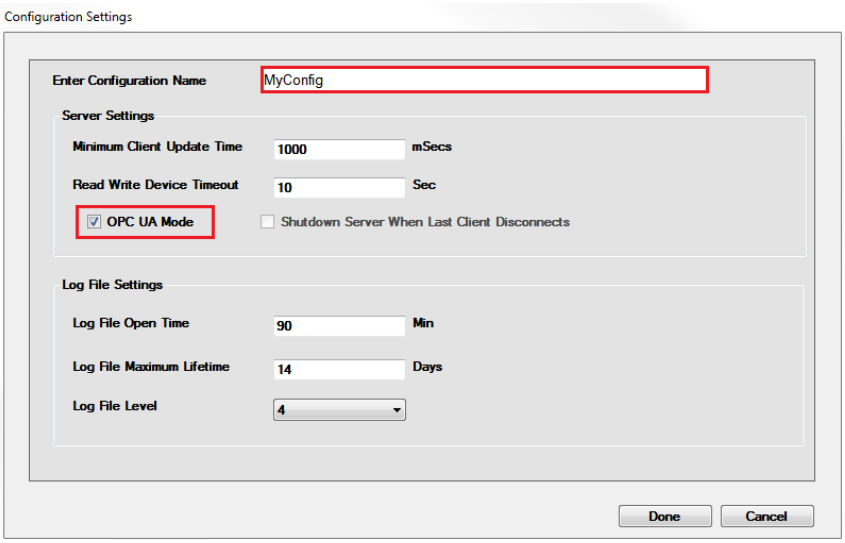


Figure 14: Configuration Settings

> **NOTE**
> Do not forget to select **OPC UA Mode**(!), otherwise server will run in OPC classic mode.

4. You can see the name of your configuration and its properties on the right hand side of the **FANUC OPC Configurator** now.

5.2 Add Machine to Configuration

1. Please add a machine by right click on your configuration:

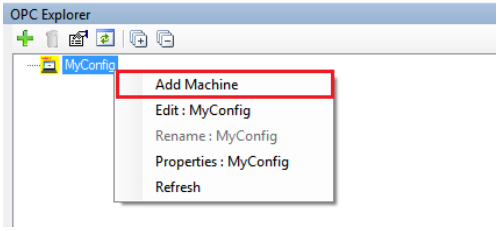


Figure 15: Add machine

2. Machine Configuration Wizards starts.

3. Enter machine name and description, if needed and click [Next].

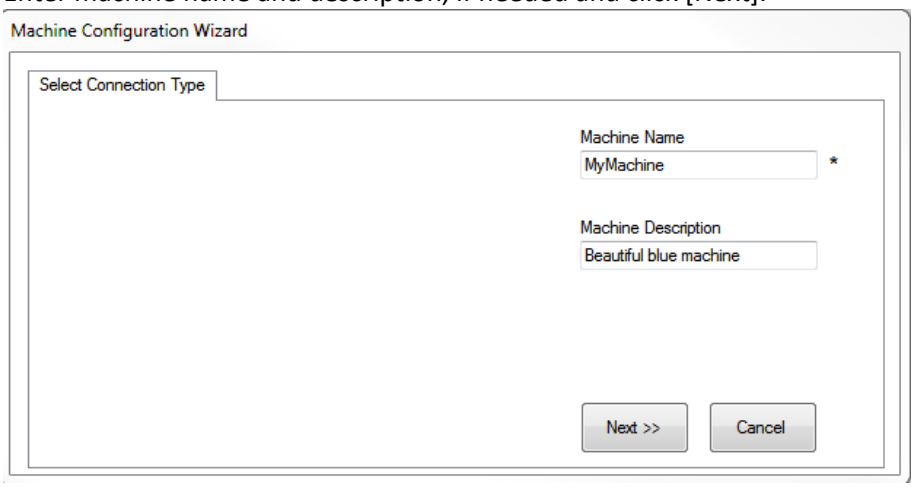


Figure 16: Machine Configuration Wizard

4. Enter Ethernet settings and click [NEXT].

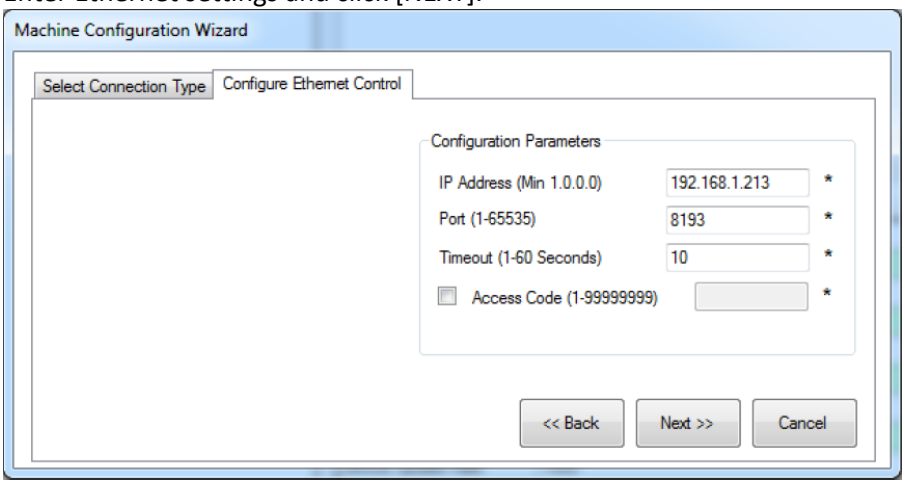


Figure 17: Ethernet settings of machine

NOTE
Port number is always **8193**.

If access code is set on Parameter No.10344 of CNC, enter same access code of CNC. If access code isn't set, there is no need to enter access code.

5. Enter control information and click [NEXT].

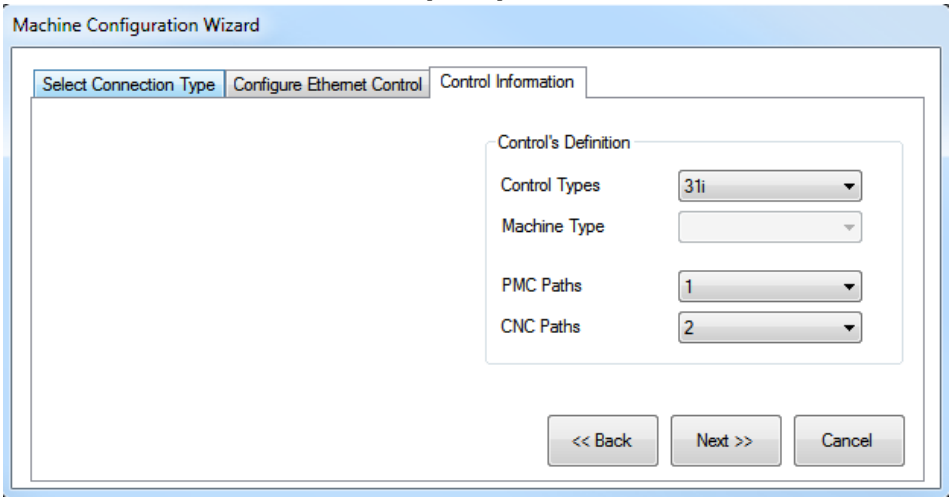


Figure 18: Control information of machine

6. Enter Name & Description for each CNC path, if needed.

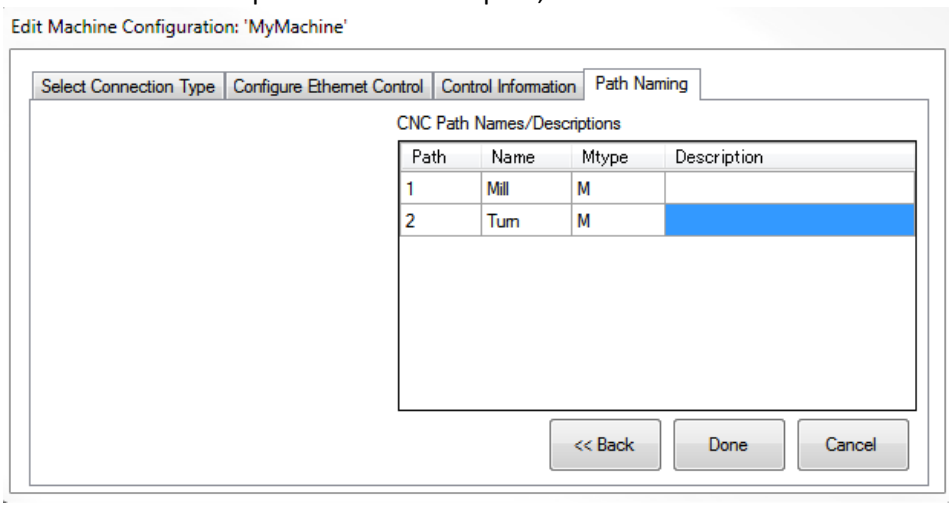


Figure 19: Path Naming

7. Click [Done] to add your machine to the configuration.

You can observe this machine now in the [OPC Explorer] window on the right hand side of the **FANUC OCP Configurator**:

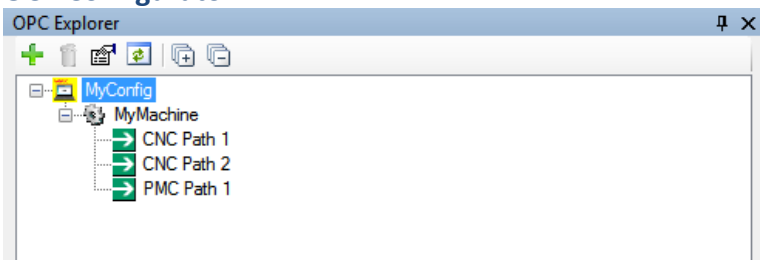


Figure 20: OPC Explorer - machine added successfully

5.3 Setting of a new Point

1. Right click on one of the CNC or PMC paths of the machine where you want to add a new data point.

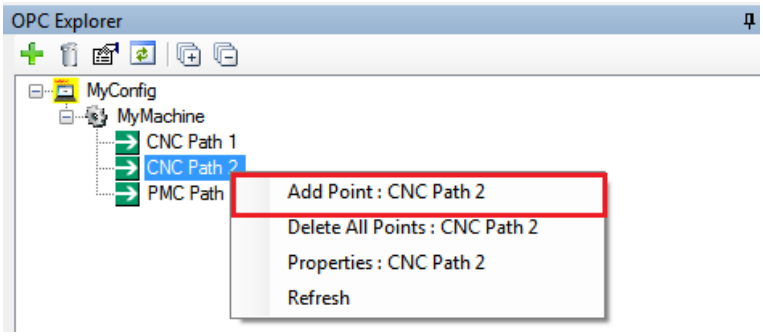


Figure 21: OPC Explorer - add new Point

2. Point Configuration Wizards starts.

3. Selection of Machine is done automatically → Please click [NEXT].

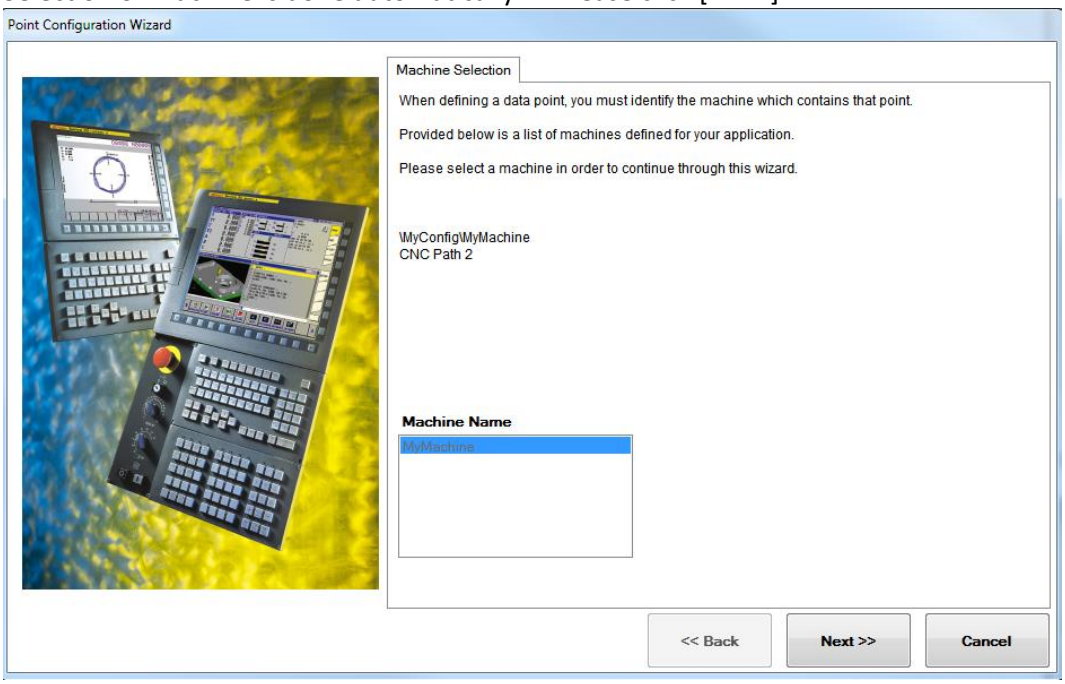


Figure 22: Set Data Point - Selection of Machine

4. Selection of Path is done automatically → please click [NEXT].

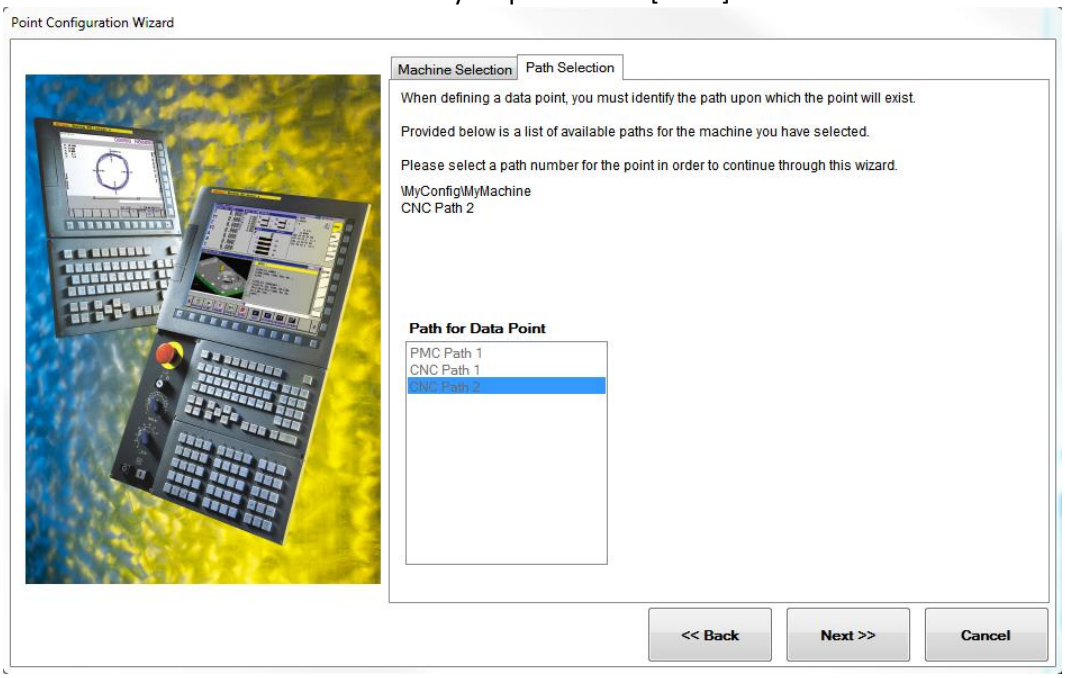


Figure 23: Set Data Point - Selection of Path for Data Point

5. Please select the Data Type you want to add and click [NEXT] afterwards.

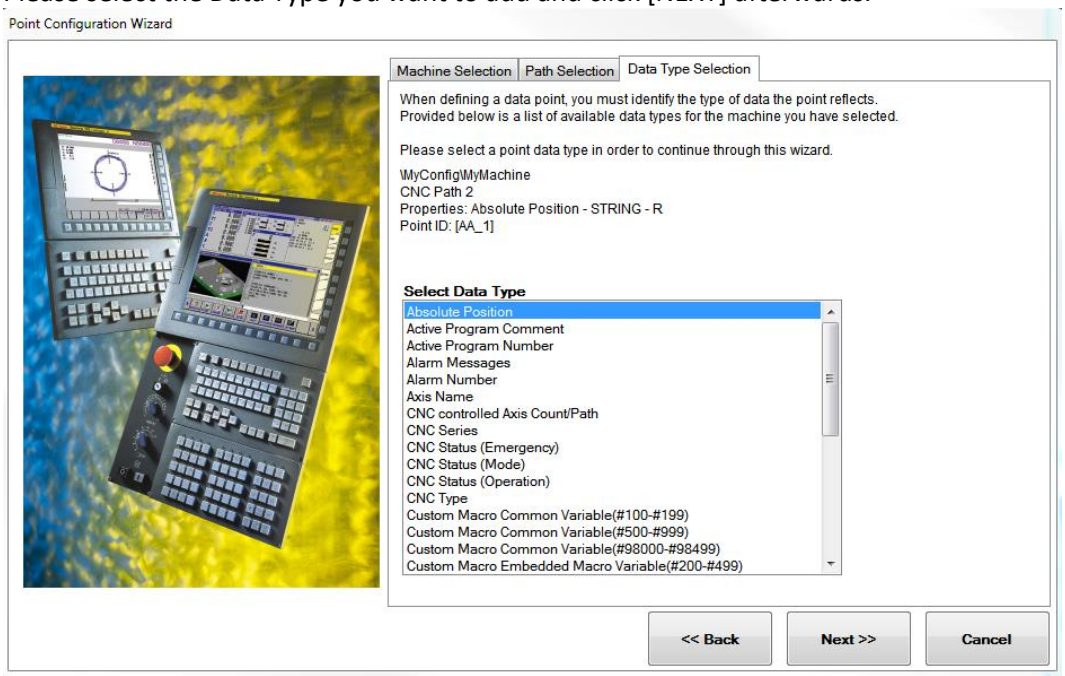


Figure 24: Set Data Point - Selection of Data Type (Example: Absolute Position)

6. Define specific information about your selected data point.

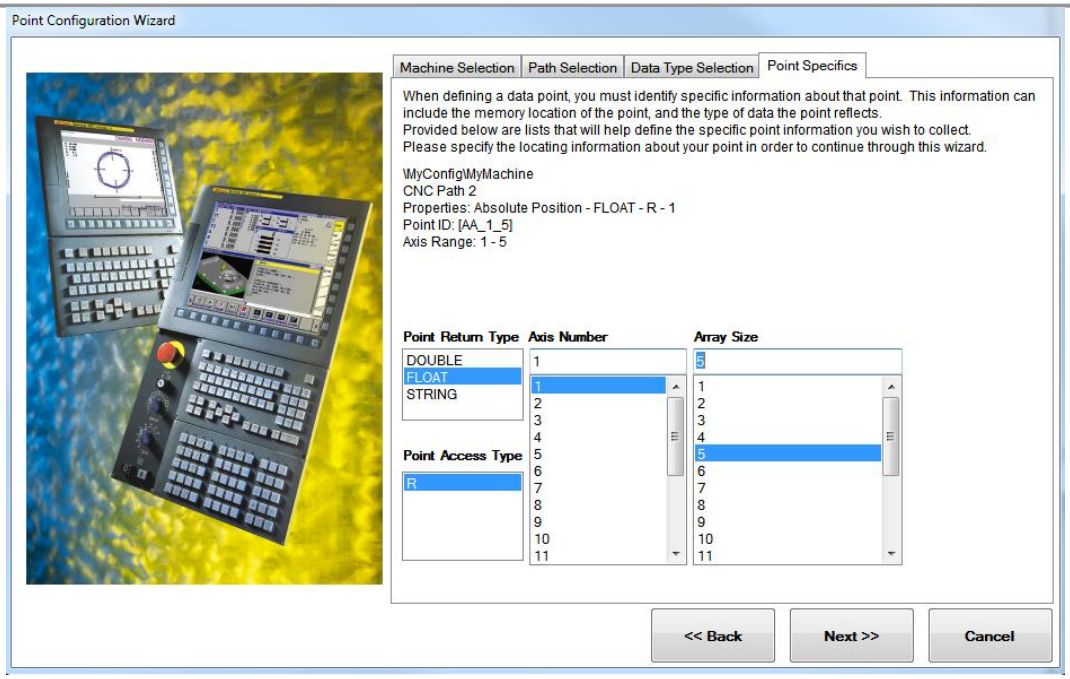


Figure 25: Specific information of Data Point (Example: Axis Position)

Point Return Type: Define data type to be returned to OPC UA client.

Point Access Type: Define access type:
R=READ
W=WRITE
RW=READ/WRITE
(In case of this example access type can only be R because data type is Axis Position)

Axis Number: Axis number of interest can be selected here.
(In case of other data types than "Axis Position" this field is named differently)

Array Size: Define array size /range of data point
(In case of this example following data will be provided by OPC server:

- position of Axis 1 as Float-Type value
- position of Axis 2 as Float-Type value
- position of Axis 3 as Float-Type value
- position of Axis 4 as Float-Type value
- position of Axis 5 as Float-Type value)

7. Define Point Name and Point Description

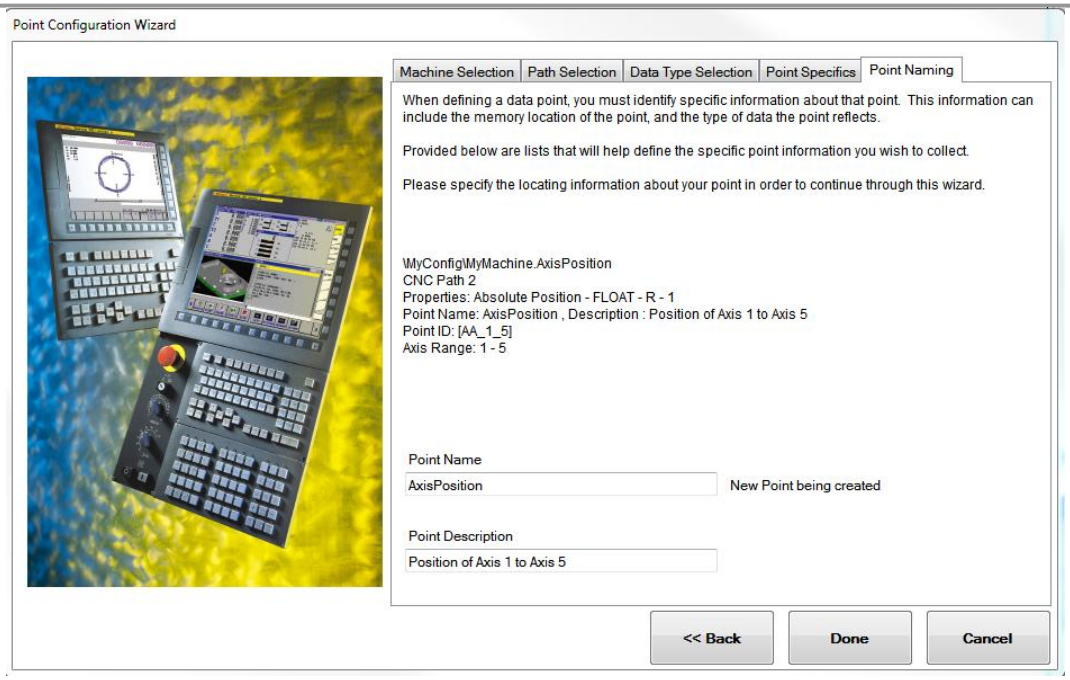


Figure 26: Point Name & Point Description

8. Please click on [Done] to add this point to selected machine & path.

   You can observe this point now in the [OPC Explorer] window on the right hand side of the **FANUC OCP Configurator**:

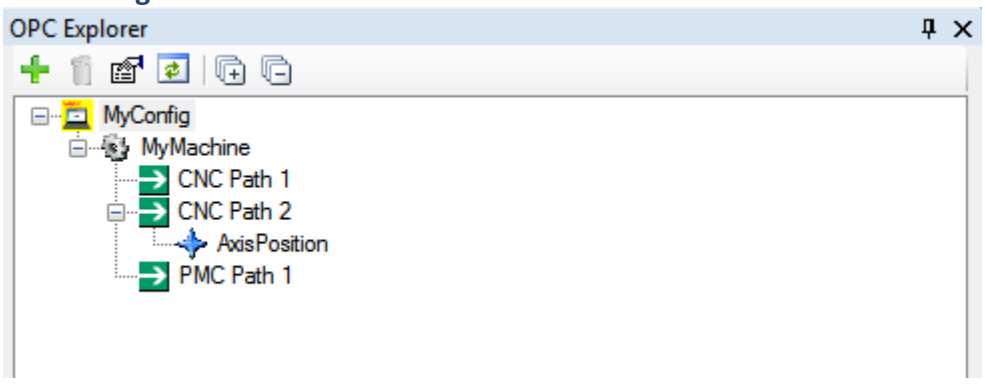


Figure 27: New point added successfully

NOTE
Point setting and machine setting can be changed anytime by right clicking on one of the listed elements and selecting “Edit…”

5.4 Save Configuration

1. Please select [File] – “Save Configuration” or “Save As Configuration”
2. Select path where you want to save your configuration.

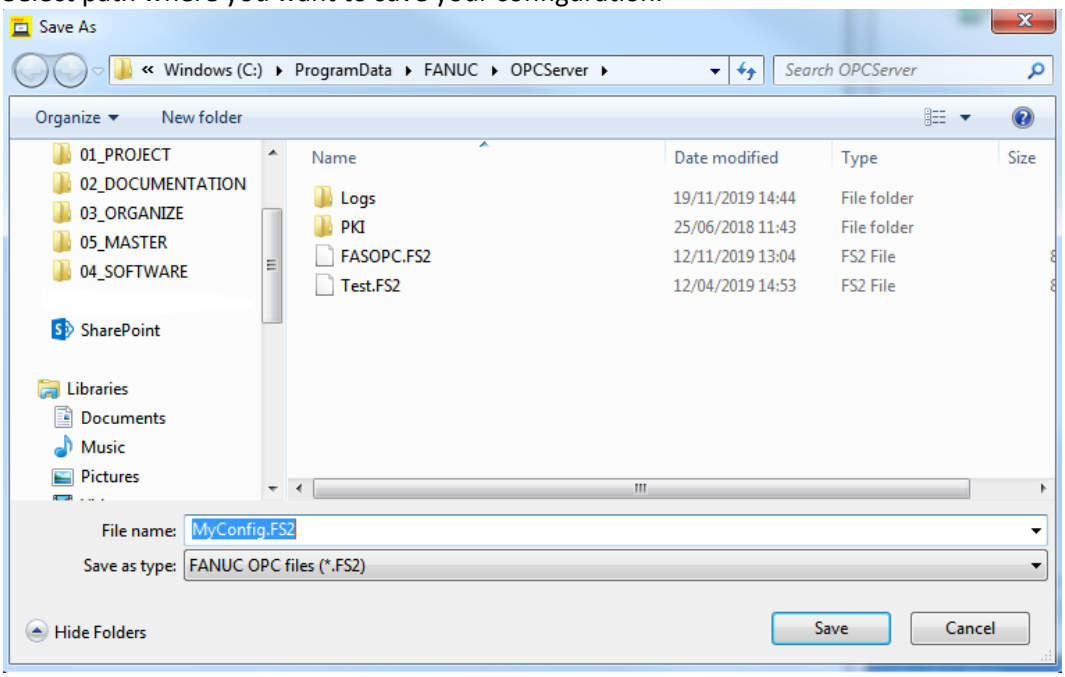


Figure 28: Save Configuration

5.5 Reflect Configuration to OPC Server

1. Please check if **FANUC OPC Server** is currently running
   a) Check Icons in Windows Taskbar:

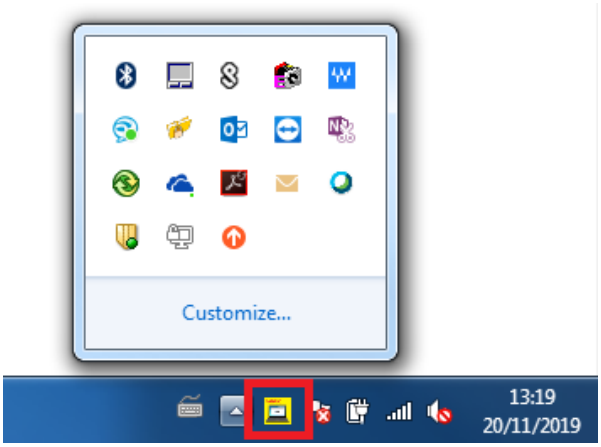


Figure 29: OPC Server ICON

➔ If this Icon is visible, OPC Server is currently running and needs to be closed.

➔ If not, you are fine and can go to step 2.

b) Please Double click on the **FANUC OPC Server** Icon

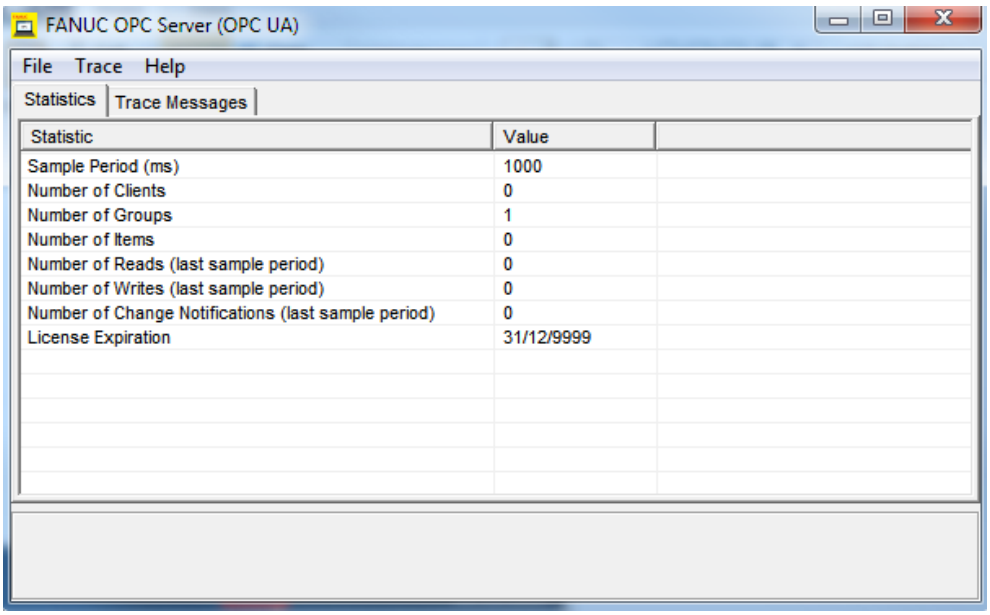


Figure 30: FANUC OPC Server is running

NOTE
Please be aware that this screen sometimes does not appear on the foreground of your desktop when double clicking on the icon. In this case please select the **FANUC OPC Server screen** with [ALT] + [TAB] or minimize all other applications on your desktop and check again.

c) Please exit OPC Server with [File] – "Exit".

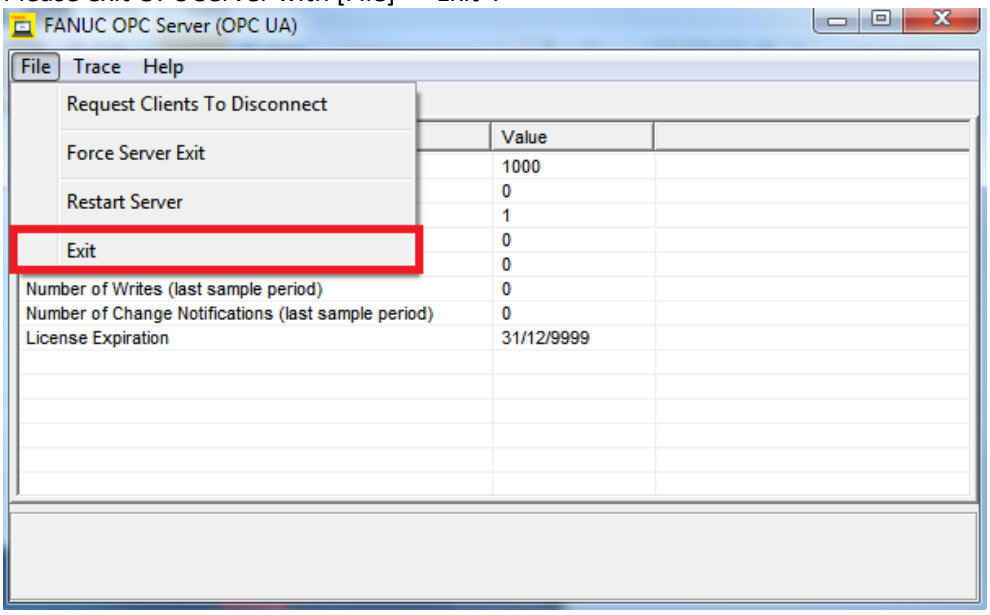


Figure 31: Exit OPC Server

➔ If this does not work, because a client is currently connected to OPC Server, please select **"Force Server Exit"**

2. Please go back to **FANUC OPC Configurator** and select [File] – "Export…"

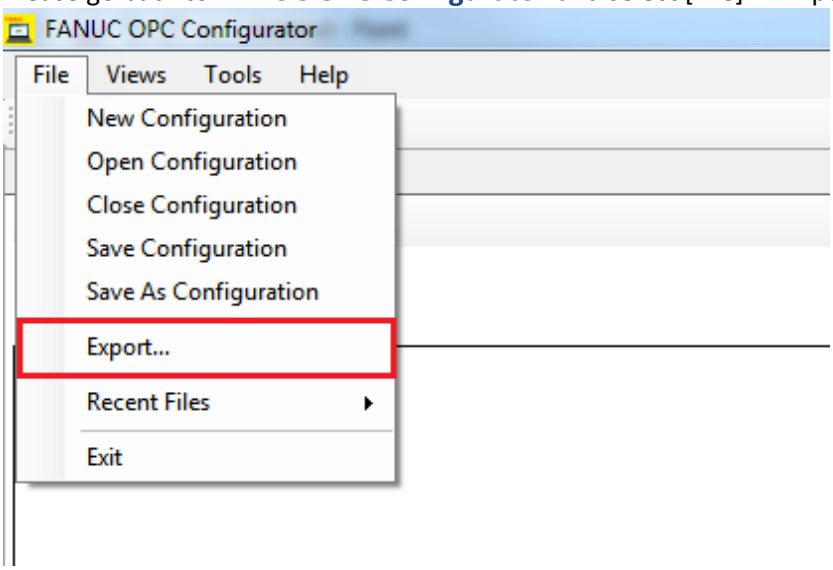


Figure 32: Export Configuration

3. Export Dialog appears → Please press [OK]

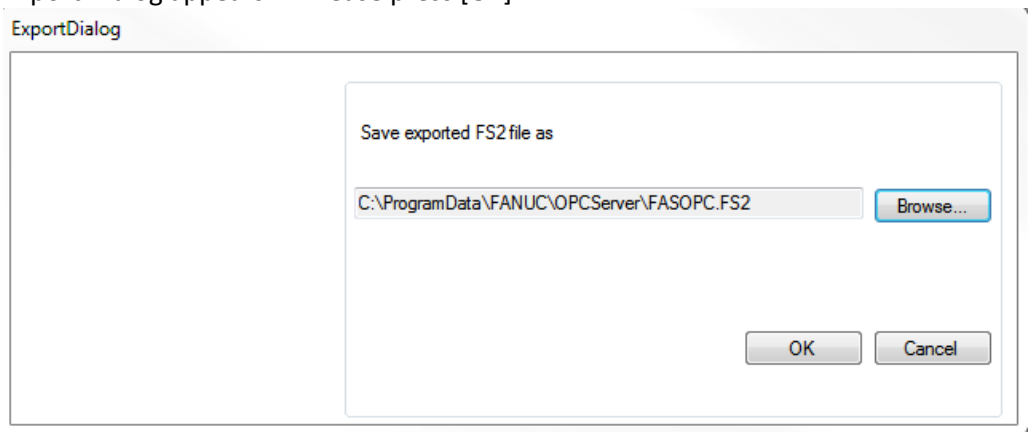


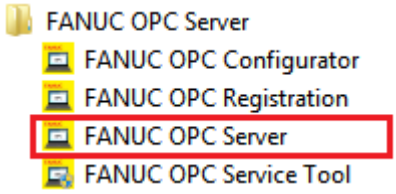
Figure 33: Export Dialog

NOTE
FANUC OPC Server reads the configuration file from this path per default in case of Windows 7. If the OPC Server is currently running, this file cannot be overwritten and you have to go back to step 1 of this chapter again.

6 Start OPC Server

6.1 Run OPC Server

1. Select **FANUC OPC Server** from Windows Start Menu



2. Confirm operation of OPC Server
   - Open **FANUC OPC Configurator** again and select [Tools] – "Server" – "Connect to Server"

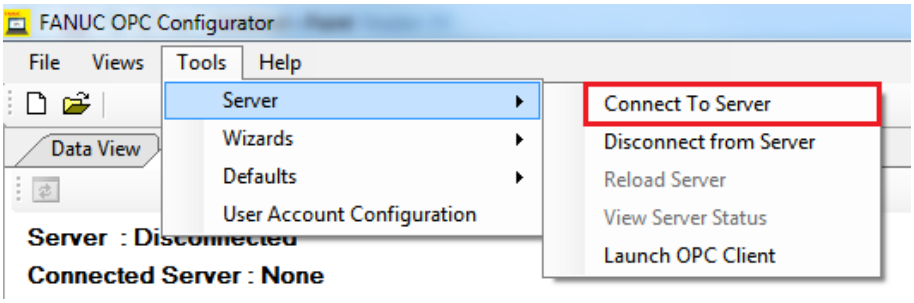


Figure 34: Tools - Connect to Server

   - Connection Dialog appears. Please press [Connect] to verify if Server is operating

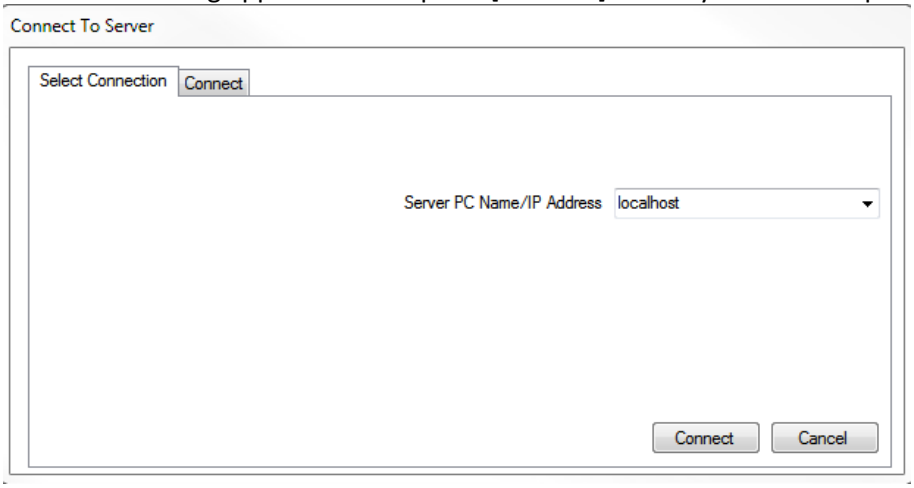


Figure 35: Connect to Server Dialog

- If Server is operating and reachable, following message appears.

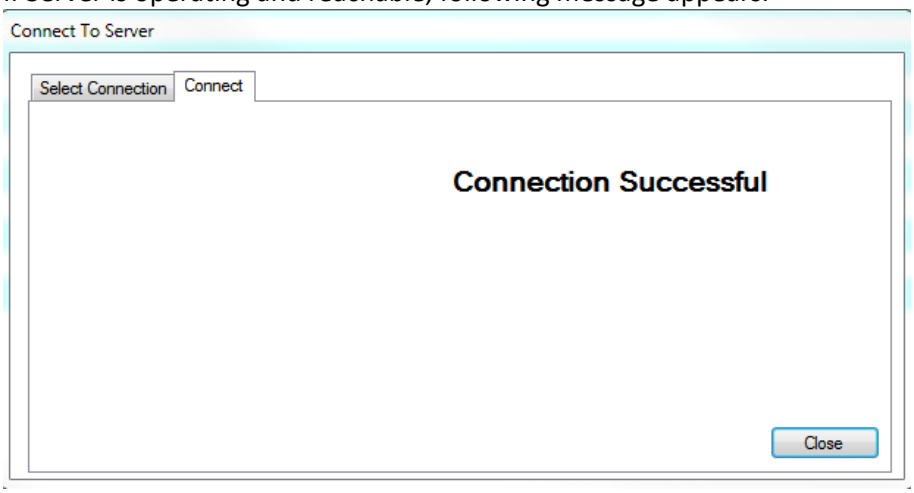


Figure 36: Connection to Server successful

3. Please confirm, if OPC Server is running in UA mode

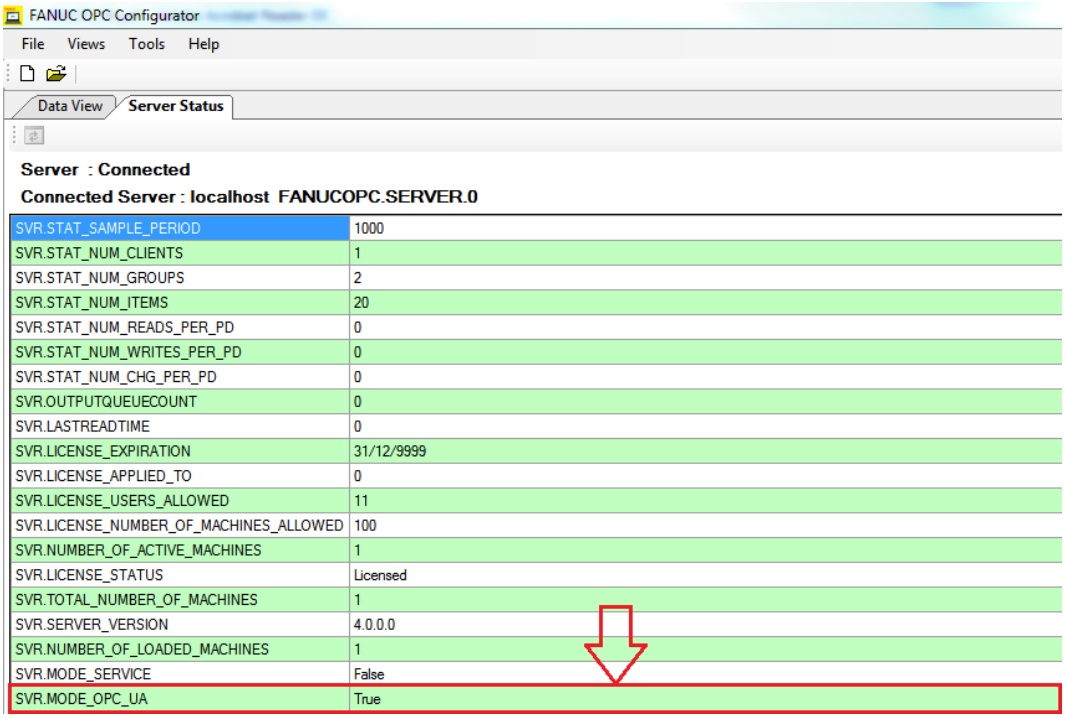


Figure 37: Observer Server Status after connection

When **FANUC OPC Configurator** is connected to server you can check if sever is running in UA mode in the [Server Status] tab.

4. Your OPC UA Server is now ready to use!

7 Source directory

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