

Transmitir Datos por OPC UA PLC S7-1200

Usando python como cliente

Configuracion PLC s7-1200 TIA PORTAL

Se tiene que habilitar el servidor OPC UA en el PLC (Modificando opciones de “hardware”) y hacer las siguientes configuraciones:

Project tree

Devices

- TCPIP_COMMUNICATION_V16_2
 - Add new device
 - Devices & networks
 - R5_ASSY_PLC [CPU 1215C DC/DC/DC]
 - Device configuration
 - Online & diagnostics
 - Program blocks
 - Technology objects
 - External source files
 - PLC tags
 - PLC data types
 - Watch and force tables
 - Online backups
 - Traces
 - OPC UA communication
 - Device proxy data
 - Program info
 - PLC alarm text lists
 - Local modules
 - Distributed I/O
 - R5_ASSY_HMI [KTP700 Basic PN]
 - Un grouped devices
 - Security settings
 - Cross-device functions
 - Common data
 - Documentation settings
 - Languages & resources
 - Version control interface
 - Add new workspace
 - Online access
 - Card Reader/USB memory

Topology view

Network view

Device view

Device overview

Module	Slot	I address	Q address	Type	Article no.
	103				
	102				
	101				
R5_ASSY_PLC	1			CPU 1215C DC/DC/...	6ES7 215-1AG40-0XB0
DI 14/DQ 10_1	1.1	0...1	0...1	DI 14/DQ 10	
AI 2/AQ 2_1	1.2	64...67	64...67	AI 2/AQ 2	
	1.3				
HSC_1	1.16	1000.....		HSC	
HSC_2	1.17	1004.....		HSC	
HSC_3	1.18	1008.....		HSC	
HSC_4	1.19	1012.....		HSC	
HSC_5	1.20	1016.....		HSC	

R5_ASSY_PLC [CPU 1215C DC/DC/DC]

General

IO tags

System constants

Texts

Advanced

Entry page

Overview of interfaces

Multilingual support

Time of day

Protection & Security

Access level

Connection mechanisms

Certificate manager

Security event

External load memory

OPC UA

General

Server

General

Options

Security

Secure channel

User authentication

Advanced configuration

DNS configuration

Configuration control

Connection resources

Overview of addresses

Runtime licenses

OPC UA

General user management

Application name: SIMATIC S7-1200.OPC-UA.Application:R5_ASSY_PLC

Note: User management via the project security settings is only enabled if the project status is set to protected with the settings options of the security settings.

☐ Enable additional user management via project security settings

Server

General

Accessibility of the server

☒ Activate OPC UA server

Server addresses

Address

opc.tcp://192.168.1.10:4840

0.- Activar OPC UA (La dirección asignada abajo es muy importante)

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Details view

TCPIP_COMMUNICATION_V16_2 > R5_ASSY_PLC [CPU 1215C DC/DC/DC]

R5_ASSY_PLC [CPU 1215C]

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	101				
R5_ASSY_PLC	1			CPU 1215C DC/DC/...	6ES7 215-1AG40-0XB0
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AI 2/IAQ 2_1	1.2	64...67	64...67	AI 2/IAQ 2	
	1.3				
HSC_1	1.16	1000.....		HSC	
HSC_2	1.17	1004.....		HSC	
HSC_3	1.18	1008.....		HSC	
HSC_4	1.19	1012.....		HSC	
HSC_5	1.20	1016.....		HSC	

R5_ASSY_PLC [CPU 1215C DC/DC/DC]

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OPC UA

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 - OPC UA

OPC UA

General

OPC UA application name

Application name: SIMATIC.S7-1200.OPC-UA.Application:R5_ASSY_PLC

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(La dirección asignada abajo es muy importante)

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Details view

TCPIP_COMMUNICATION_V16_2 → R5_ASSY_PLC [CPU 1215C DC/DC/DC]

Topology view | Network view | Device view

R5_ASSY_PLC [CPU 1215C]

Rack_0

103 102 101

1 2 3 4

DI 14/DQ 10_1
AI 2/AQ 2_1

HSC_1
HSC_2
HSC_3
HSC_4
HSC_5
HSC_6
Pulse_1
Pulse_2
Pulse_3
Pulse_4
OPC UA
PROFINET interface_1

DI 16x24VDC/DQ 16xRelay_1
DI 16/DQ 16x24VDC_1
DI 16/DQ 16x24VDC_2

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▼ R5_ASSY_PLC	1			CPU 1215C DC/DC/...	6ES7 215-1AG40-0XB0
DI 14/DQ 10_1	1 1	0...1	0...1	DI 14/DQ 10	
AI 2/AQ 2_1	1 2	64...67	64...67	AI 2/AQ 2	
	1 3				
HSC_1	1 16	1000.....		HSC	
HSC_2	1 17	1004.....		HSC	
HSC_3	1 18	1008.....		HSC	
HSC_4	1 19	1012.....		HSC	
HSC_5	1 20	1016.....		HSC	
HSC_6	1 21	1020.....		HSC	
Pulse_1	1 32	1000.....		Pulse generator (PT...	
Pulse_2	1 33	1002.....		Pulse generator (PT...	
Pulse_3	1 34	1004.....		Pulse generator (PT...	
Pulse_4	1 35	1006.....		Pulse generator (PT...	
OPC UA	1 254			OPC UA	
PROFINET interface_1	1 X1			PROFINET interface	
DI 16x24VDC/DQ 16xRelay_1	2	2...3	2...3	SM 1223 DI16/DQ1...	6ES7 223-1PL32-0XB0
DI 16/DQ 16x24VDC_1	3	4...5	4...5	SM 1223 DI16/DQ1...	6ES7 223-1BL32-0XB0
DI 16/DQ 16x24VDC_2	4	6...7	6...7	SM 1223 DI16/DQ1...	6ES7 223-1BL32-0XB0
	5				
	6				
	7				
	8				
	9				

Properties | Info | Diagnostics

General | IO tags | System constants | Texts

General

- Options
- Security
 - Secure channel
 - User authentication
- Advanced configuration
 - DNS configuration
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OPC UA

Runtime licenses

Type of required license: SIMATIC OPC UA S7-1200 basic

Type of purchased license: SIMATIC OPC UA S7-1200 basic

1.- Seleccionar licencia

R5_ASSY_PLC [CPU 1215C DC/DC/DC]

Properties Info Diagnostics

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Secure channel

Server certificate

⚠ The global security settings for the certificate manager are not enabled.
Only limited functionality is available.
The server certificate is used to verify the servers identity when it is accessed and to enable endpoint security.

Server certificate: PLC-1/OPCUA-1

Security policies

Note: When the 'No security' security policy is activated, any OPC UA client can still connect using this setting, regardless of any security settings that follow.

Security policies available on the server:

Activate sec..	Name
<input checked="" type="checkbox"/>	No security
<input type="checkbox"/>	Basic128Rsa15 - Sign
<input type="checkbox"/>	Basic128Rsa15 - Sign & Encrypt
<input type="checkbox"/>	Basic256 - Sign
<input type="checkbox"/>	Basic256 - Sign & Encrypt
<input checked="" type="checkbox"/>	Basic256Sha256 - Sign
<input checked="" type="checkbox"/>	Basic256Sha256 - Sign & Encrypt

2.- Seleccionar la seguridad, para este caso como usamos python activamos “No security” (No e podido hacerlo funcionar con contraseña)

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> > User authentication

Guest authentication

Note: The guest authentication allows access to the server without authentication by username/password.

☒ Enable guest authentication

User name and password authentication

Note: Enabling this option allows users to authenticate themselves by providing a valid user name and password.

☒ Enable user name and password authentication

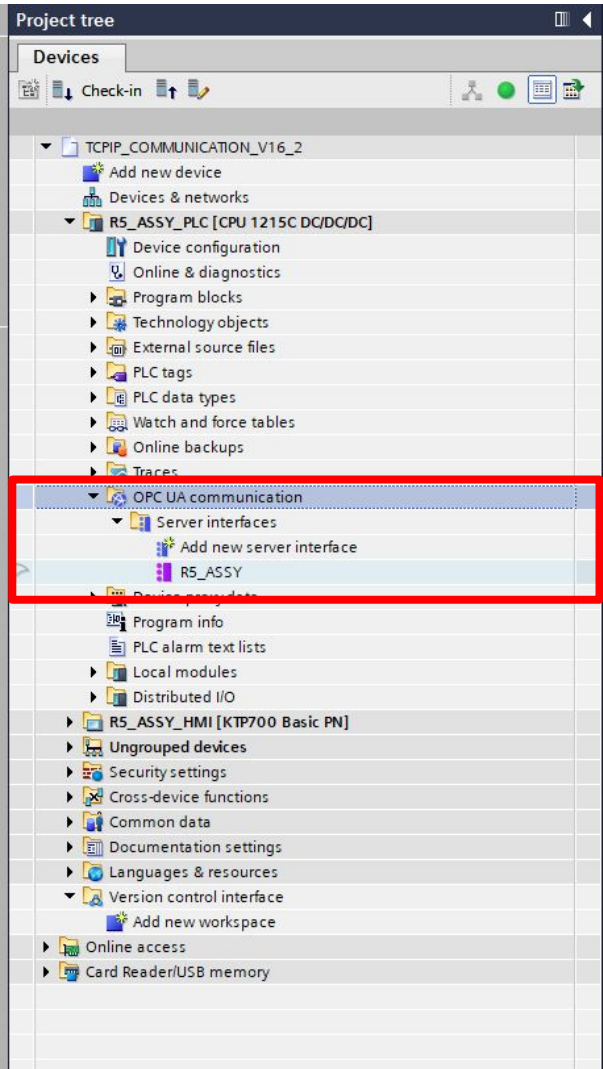
Note

User management

	Name	Password
	CIP	*****
	<Add new user>	

3.- Activar identificación como invitado

Habilitar datos que se leerán en el servidor



Creamos una interface donde leeremos o escribiremos los datos

Aquí seleccionas el dato que quieras, desde tus datos del PLC

The screenshot displays the Siemens SIMATIC Manager interface, specifically the 'OPC UA communication' section under 'Server interfaces'. A red rectangle highlights the 'OPC UA server interface' configuration table and the 'OPC UA elements' list.

OPC UA server interface

	Browse name	Node type	Local data
1	RS_ASSY	Interface	
2	PIEZA	ARRAY[0..20] of ST...	
3	DatoReady	BOOL	"DB_PIEZAS_TRACE"."DatoReady"
4	Dato_Guardado	BOOL	"DB_PIEZAS_TRACE"."Dato_Guardado"
5	<Add new>		

OPC UA elements

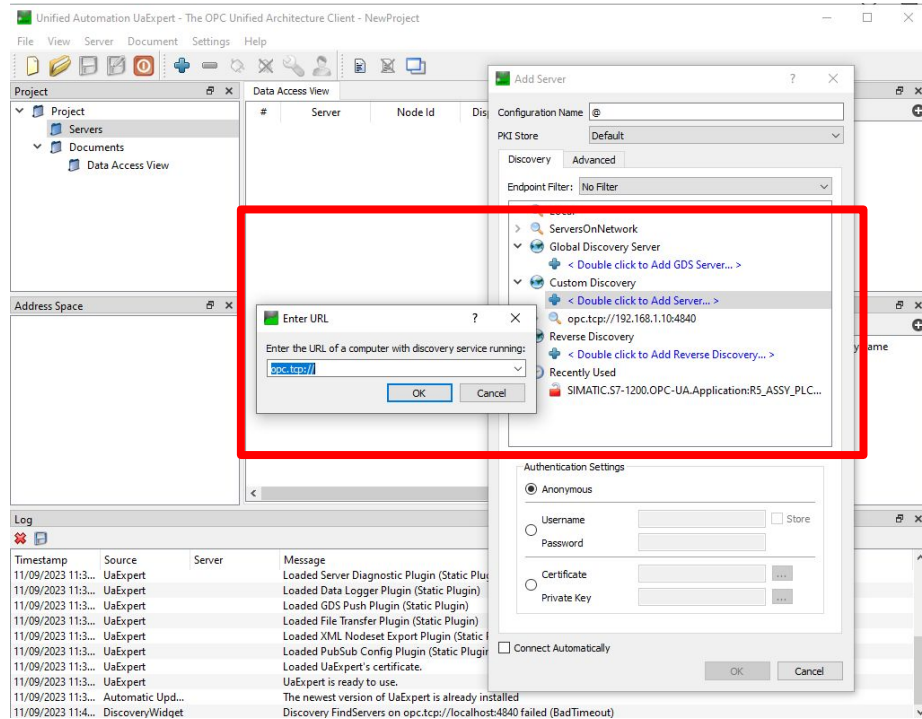
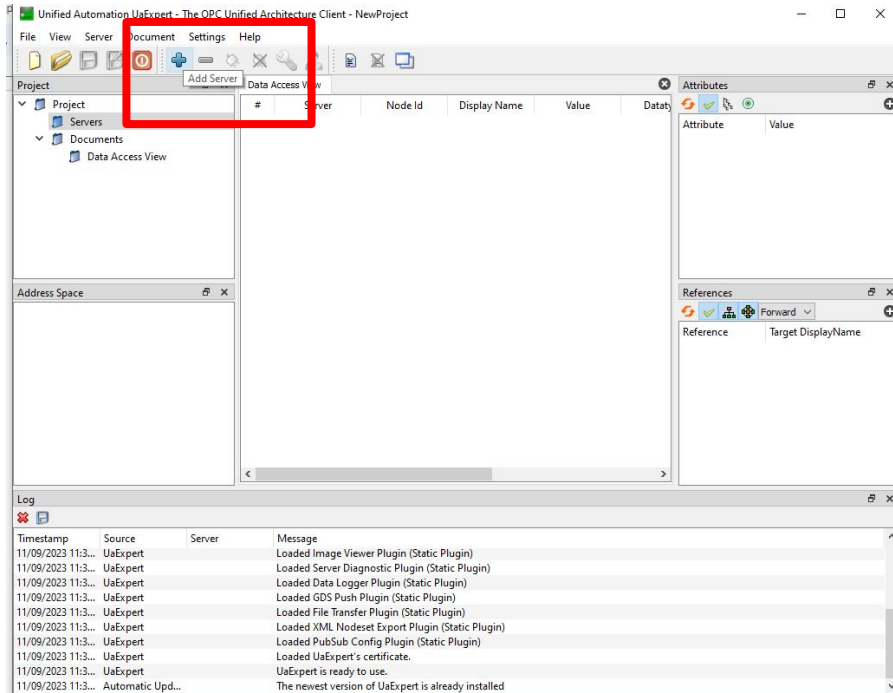
	Project data	Data type
1	Program blocks	
2	Technology objects	
3	PLC tags	

The left sidebar shows the project tree with the following structure:

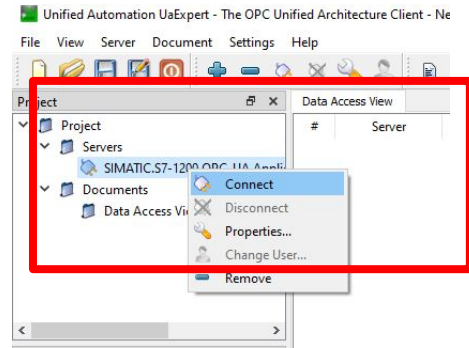
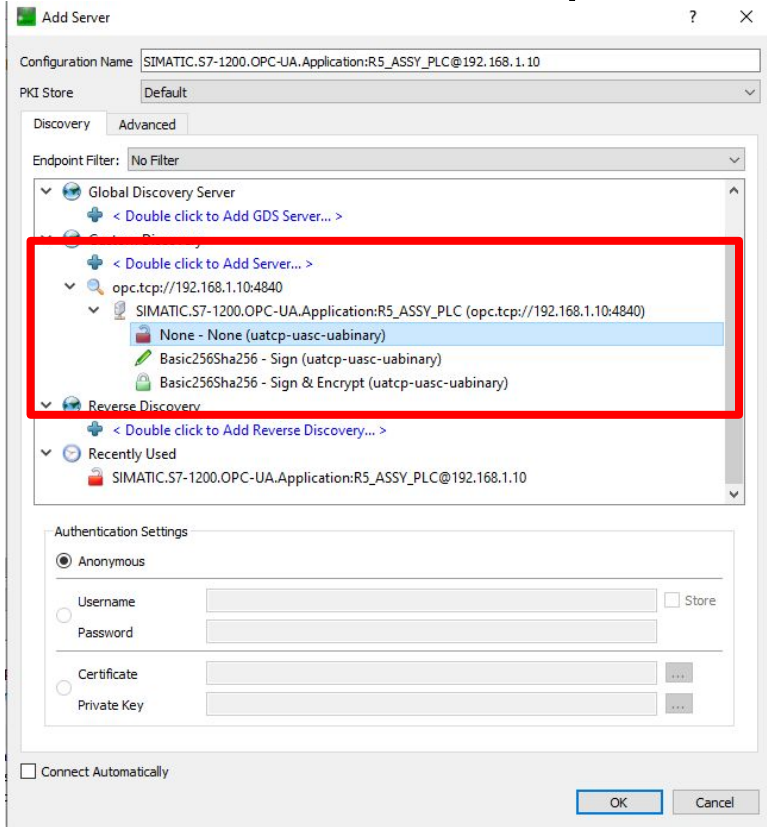
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Probando comunicación (Con UA EXPERT)

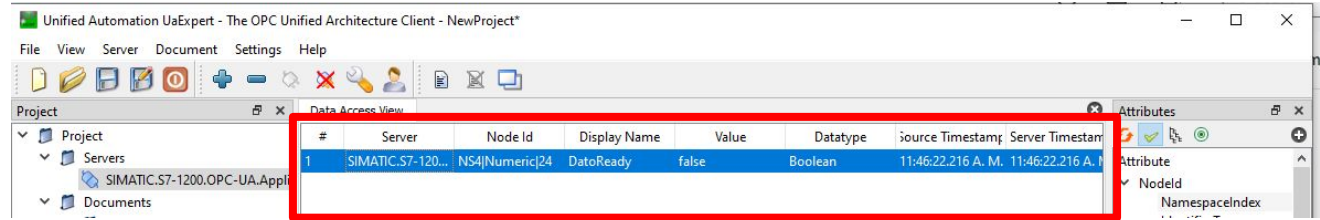
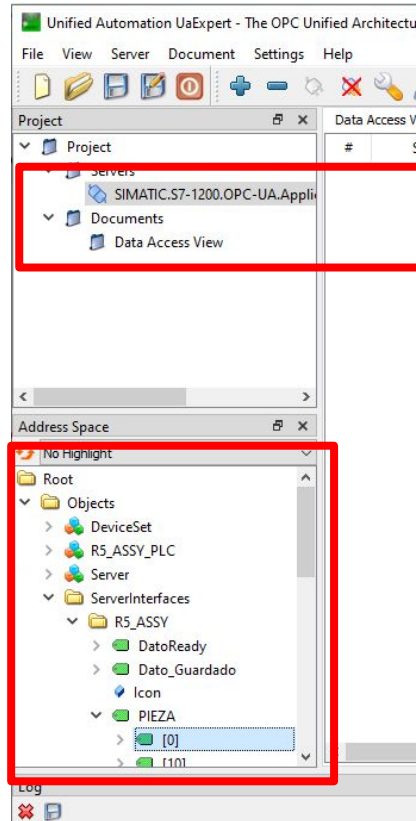
Añadimos el server, con su dirección y hacemos doble click



Seleccionamos que haremos login sin nada, doble click en las partes seleccionadas



Ahora podemos ver los datos, arrastrando los datos a data access podemos modificar o ver los datos



Podemos monitorear desde el PLC, cambiar valores y ver si se reflejan

Project tree: ...PIP_COMMUNICATION_V16_2 > RS_ASSY_PL_C [CPU 1215C DC/DC/DC] > Program blocks > 08_TRAZABILIDAD > DB_PIEZAS_TRACE [DB22]

DB_PIEZAS_TRACE

Name	Data type	Start value	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
32 Var_anterior_4	String	"	"		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
33 Var_anterior_5	String	"	"		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
34 Var_anterior_6	String	"	"		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
25 Trigger_1	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
26 Trigger_2	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
27 Trigger_3	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
28 Trigger_4	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
29 Trigger_5	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
30 Trigger_6	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
31 Dato_ok_1	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
32 Dato_ok_2	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
33 Dato_ok_3	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
34 Dato_ok_4	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
35 Dato_ok_5	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
36 Dato_ok_6	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
37 LeadC_Z	Real	0.0	0.0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
38 LeadG_Z	Real	0.0	0.0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
39 Tiempo_ciclo	Real	0.0	0.0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
40 Tiempo_ciclo_buffer	Time	TIME	TIME		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
41 P_scrap	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
42 Recorrer_Busy	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
43 DatoReady	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
44 Dato_Guardado	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
45 DatoBorrado	Bool	false	FALSE		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
46 Counter_Borrar_datos	Int	0	0		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
47 TamañoArray	Byte	20	16814		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

#	Server	Node Id	Display Name	Value	Datatype	Source Timestamp	Server Timestamp
1	SIMATIC.S7-120...	NS4 Numeric 24	DatoReady	<input checked="" type="checkbox"/>	Boolean	11:48:48.761 A. M.	11:48:48.761 A. M.

42	Recorrer_Busy	Bool	false	FALSE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
43	DatoReady	Bool	false	TRUE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
44	Dato_Guardado	Bool	false	FALSE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

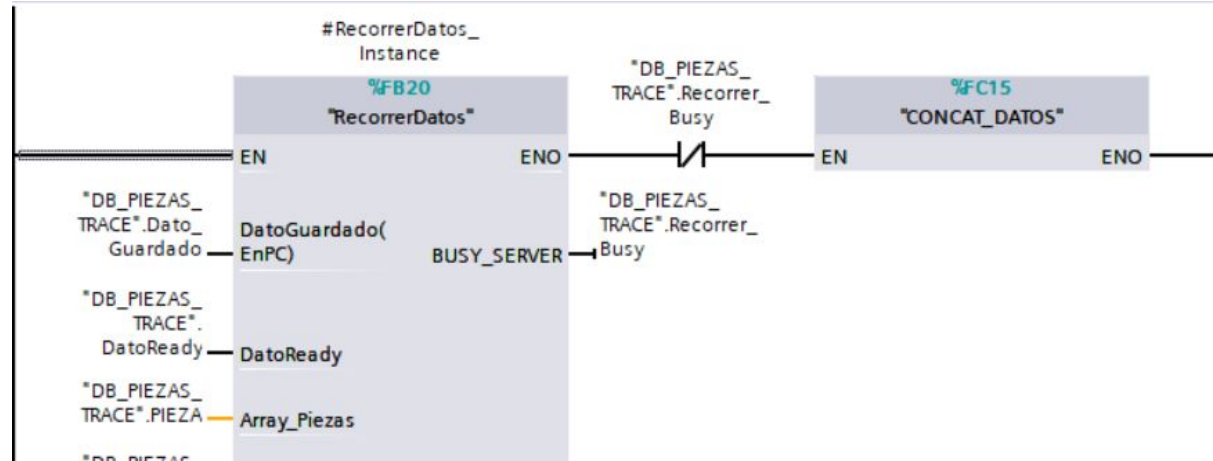
Ejemplo de uso con python

[https://github.com/KevinAngel1233/OPCUA
PYTHON_PLC_S7_1200.git](https://github.com/KevinAngel1233/OPCUA_PYTHON_PLC_S7_1200.git)

Explicación código

El código de python activa variables de los siguientes bloques,

Se tiene un array de strings de los cuales queremos guardar el primero de la cola siempre y cuando el dato esté listo y recorrer los demás datos borrando el que se acaba de guardar.



Static				
PIEZA	Array[0..20] of String			
PIEZA[0]	String	"		'A'
PIEZA[1]	String	"		'B'
PIEZA[2]	String	"		'C'
PIEZA[3]	String	"		'D'
PIEZA[4]	String	"		"
PIEZA[5]	String	"		"
PIEZA[6]	String	"		"

64	DatoReady	Bool	false	TRUE
----	-----------	------	-------	------

Resultados 1ra ejecución
python:

```
Connected: opc.tcp://192.168.1.10:4840
DatoReady: False
DatoNoListo
Disconnected
```

2	PIEZA	Array[0..20] of String		
3	PIEZA[0]	String	"	'B'
4	PIEZA[1]	String	"	'C'
5	PIEZA[2]	String	"	'D'
6	PIEZA[3]	String	"	"

Resultados 2da ejecución
python:

```
Connected: opc.tcp://192.168.1.10:4840
DatoReady: True
STRINGPieza: A
beforeDatoGuardado: False
afterDatoGuardado: True
beforeDatoGuardado: True
afterDatoGuardado: False
beforeDatoReady: True
afterDatoReady: False
Disconnected
```

64	DatoReady	Bool	false	FALSE
----	-----------	------	-------	-------