ENGINEERING
TOMORROW

Operating Guide

iC7 Series OPC UA

OPC UA OS7UC

drives.danfoss.com | iC7

Contents

1 Introduction and Safety

1.1 Purpose of the Guide

This operating guide provides information about configuring the system, controlling the drive, accessing parameters, configuring, troubleshooting, and some typical application examples. The operating guide is intended for use by qualified personnel, who are familiar with the iC7 drives, OPC UA technology, and the PC or PLC that is used as a controller in the system.

Read the instructions before configuring OPC UA and follow the procedures in this guide.

The OPC UA client shown in the examples in this guide is UaExpert. Instructions for using the different simulation tools are not in the scope of this guide. Refer to the documentation of the client in use for the instructions.

1.2 Additional Resources

Additional resources are available to help understand the features, and safely install and operate the iC7 series products:

- Safety guides, which provide important safety information related to installing iC7 series drives and power converters.
- Installation guides, which cover the mechanical and electrical installation of drives, power converters, or functional extension options.
- Design guides, which provide technical information to understand the capabilities of the iC7 series drives or power converters for integration into motor control and monitoring systems.
- Operating guides, which include instructions for control options, and other components for the drive.
- Application guides, which provide instructions on setting up the drive or power converter for a specific end use. Application guides for application software packages also provide an overview of the parameters and value ranges for operating the drives or power converters, configuration examples with recommended parameter settings, and troubleshooting steps.
- *Facts Worth Knowing about AC Drives*, available for download on www.danfoss.com.
- Other supplemental publications, drawings, and guides are available at www.danfoss.com.

Latest versions of Danfoss product guides are available for download at https://www.danfoss.com/en/service-and-support/documentation/.

1.3 Safety Symbols

The following symbols are used in Danfoss documentation.

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

The guide also includes ISO symbols for general warnings, warnings related to hot surfaces and burn hazard, high voltage and electric shock, and referring to the instructions.

⚠	ISO warning symbol for general warnings
♨	ISO warning symbol for hot surfaces and burn hazard
⚡	ISO warning symbol for high voltage and electric shock
📖	ISO action symbol for referring to the instructions

1.4 Qualified Personnel

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the product. Only qualified personnel are allowed to install and operate this equipment.

Qualified personnel are defined as trained staff, who are authorized to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Also, the qualified personnel must be familiar with the instructions and safety measures described in this guide.

1.5 Safety Precautions

⚠ **WARNING**

HIGH VOLTAGE

Drives and power converters contain high voltage when connected to AC mains input, DC supply, or load sharing. Failure to perform installation, startup, and maintenance by qualified personnel can result in death or serious injury.

- Only qualified personnel are allowed to perform installation, startup, and maintenance.

⚠ WARNING

UNINTENDED START

When the drive or power converter is connected to the AC mains or connected on the DC terminals, the motor may start at any time, causing risk of death, serious injury, and equipment or property damage.

- Stop the drive or power converter before configuring parameters.
- Make sure that the drive or power converter cannot be started by an external switch, a fieldbus command, an input reference signal from the control panel, or after a cleared fault condition.
- Disconnect the drive or power converter from the mains whenever safety considerations make it necessary to avoid an unintended motor start.
- Check that the drive or power converter and any driven equipment are in operational readiness.

⚠ WARNING

DISCHARGE TIME

The drive or power converter contains DC-link capacitors, which can remain charged even when the drive or power converter is not powered. High voltage can be present even when the warning indicator lights are off. Failure to wait the specified time after power has been removed before performing service or repair work can result in death or serious injury.

- Stop the motor.
- Disconnect all power sources, including permanent magnet type motors.
- Wait for capacitors to discharge fully. The discharge time is specified on the drive or power converter product label.
- Measure the voltage level to verify full discharge.

⚠ WARNING

LEAKAGE CURRENT HAZARD

Leakage currents exceed 3.5 mA. Failure to ground the drive or power converter properly can result in death or serious injury.

- Ensure that the minimum size of the ground conductor complies with the local safety regulations for high touch current equipment.

⚠ WARNING

EQUIPMENT HAZARD

Contact with rotating shafts and electrical equipment can result in death or serious injury.

- Ensure that only trained and qualified personnel perform installation, start-up, and maintenance.
- Ensure that electrical work conforms to national and local electrical regulations.
- Follow the procedures in this guide.

⚠ CAUTION

INTERNAL FAILURE HAZARD

An internal failure in the drive or power converter can result in serious injury when the drive or power converter is not properly closed.

- Ensure that all safety covers are in place and securely fastened before applying power.

1.6 Abbreviations

Table 1: Abbreviations

Term	Definition
AddressSpace	Collection of information that an OPC UA Server makes visible to its clients.
Attribute	Data element of a node which can be read and written by a client.
BrowseName	Attribute of a node: Nodes have a BrowseName attribute that is used as a non-localized human-readable name when browsing the AddressSpace to create paths out of BrowseNames.
Compute	The device using data from servers to aggregate information, for example a SCADA or cloud.
Endpoint	A physical address available on a network that allows clients to access one or more services provided by a server.
Discovery	Mechanism which allows OPC UA clients to find OPC UA servers on the network.
DiscoveryUrl	A URL for a network endpoint that provides the information required to connect to a server.
DisplayName	Attribute of a node: a human-readable name that is used to identify the node during browsing operations.
Information Model	Organizational framework that defines, characterizes, and relates information resources of a given system or set of systems.
Method	Callable software function that is a component of an object.
MyDrive® Insight	Commissioning tool
Namespace	A container for NodeIDs with commonalities. Typically used for companion specification content and other OPC specifications, for example, UA and/or DA.
Node	Fundamental component of an address space
NodeId	A unique identifier assigned to every node (variables, methods, objects) in the address space. The NodeId is used by clients to directly access the node, for example, reading, writing and calling methods.
Object	Node that represents a physical or abstract element of a system.
ObjectType	Node that represents the type definition for an object.
OPC UA	OPC Unified Architecture (OPC UA) is a machine-to-machine communication protocol used for industrial automation and developed by the OPC Foundation.
Reference	Explicit relationship (a named pointer) from one node to another.
SCADA	Supervisory Control And Data Acquisition, typically the machine-user interface.
Secure Channel	A logical connection between a single client and a single server.

Table 1: Abbreviations - (continued)

Term	Definition
Service	Client-callable operation in an OPC UA server.
Session	A long-term logical connection between a single client and a single server on OPC UA application level.
Variable	Node that contains a value.

1.7 Trademarks

OPC UA is a trademark of the OPC Foundation.

1.8 Version History

This guide is regularly reviewed and updated. All suggestions for improvement are welcome.

The original language of this guide is English.

Table 2: Version History

Version	Remarks
AQ513539982268, version 0101	First release.

2 Product Overview

2.1 Overview

The iC7 drives and power converters support fieldbus protocols for horizontal communication to control devices and monitoring protocols for providing data vertically to SCADA and/or Cloud.

The OPC UA monitoring protocol can be ordered as an add-on to a fieldbus protocol when ordering a drive, or alternatively, it can be activated later by a proof-of-purchase token.

Table 3: OPC UA Model Codes

Model code	Description
+BBUC	OPC UA OS7UC

OPC UA is an Ethernet-based monitoring protocol and can be used together with fieldbus protocols based on standard Ethernet. Interface selection depends on the fieldbus protocol. Some fieldbus protocols change the Ethernet layer and as a result, OPC UA is only available for interface X0. For more information on the interface selection, see 3.3.1 Configuring OPC UA.

2.2 iC7 Series OPC UA OS7UC Features

2.2.1 OPC UA Server

iC7 series OPC UA OS7UC implements an OPC UA server providing the features listed in Table 4 and supports authentication methods listed in Table 5.

Table 4: Server Features

Category	Name	Description
Encoding	OPC UA Binary	Supports UA Binary Encoding. Values of these data types are encoded in compact binary formats, contiguously and without tagging, that is, the receiver is assumed to understand the structure it is decoding.
Transport	UA-TCP UA-SC UA Binary	This transport facet defines a combination of network protocol, security protocol, and message encoding that is optimized for low resource consumption and high performance. It combines the simple TCP-based network protocol UA-TCP 1.0 with the binary security protocol UA-SecureConversation 1.0 and the binary message encoding UA-Binary 1.0.
Security Policy	Basic256Sha256	This security facet defines a security policy used for configurations with high security needs. The security facet requires a PKI infrastructure.
	Aes256Sha256RsaPss	This security facet defines a security policy used for configurations with average security needs. The security facet requires a PKI infrastructure.
	Aes128Sha256RsaOeap	This security facet defines a security policy used for configurations with high security needs. The security facet requires a PKI infrastructure.
Message Security Mode	Sign	Provides authenticity and no confidentiality. Used when confidentiality is of no concern.
	Sign & Encrypt	Provides authenticity and confidentiality to the level provided by the selected security policy.

Table 5: Authentication Methods

Name	Description
Anonymous	A user that is not yet authenticated.
Username Password	Authentication of the users defined on the device using username and password.

For more information on user accounts and roles, see 3.2.1 User Management.

2.2.2 Supported Services

iC7 series OPC UA OS7UC supports services listed in Table 6.

Table 6: Supported Services

Category	Name	Description
Discovery	FindServers()	This service returns the servers known to a server or discovery server. The behavior of discovery servers is described in detail in OPC 10000-12.
	GetEndpoints()	This service returns the endpoints supported by a server and all of the configuration information required to establish a secure channel and a session.
Secure Channel	OpenSecureChannel()	This service is used to open or renew a secure channel that can be used to ensure confidentiality and integrity for message exchange during a session. This service requires the communication stack to apply the various security algorithms to the messages as they are sent and received. Specific implementations of this service for different communication stacks are described in OPC 10000-6.
	CloseSecureChannel()	This service is used to terminate a secure channel.
Session	CreateSession()	This service is used by an OPC UA client to create a session, and the server returns 2 values which uniquely identify the session.
	CloseSession()	This service is used to terminate a session.
	ActivateSession()	This service is used by the client to specify the identity of the user associated with the session.
View	Browse()	This service is used to discover the references of a specified node. The browse can be further limited by the use of a View. This Browse service also supports a primitive filtering capability.
	BrowseNext()	This service is used to request the next set of Browse or BrowseNext response information that is too large to be sent in a single response.
	TranslateBrowsePathsToNodeIds()	This service is used to request that the server translates 1 or more browse paths to NodeIds.
	RegisterNodes()	A server often has no direct access to the information that it manages. Variables or services might be in underlying systems where additional effort is required to establish a connection to these systems. The RegisterNodes service can be used by clients to register the nodes that they know they access repeatedly (for example, Write or Call). It allows servers to set up anything needed so that the access operations are more efficient.
	UnregisterNodes()	This service is used to unregister NodeIds that have been obtained via the RegisterNodes service.

Table 6: Supported Services - (continued)

Category	Name	Description
Attribute	Read()	This service is used to read 1 or more attributes of 1 or more nodes.
	Write()	This service is used to write values to 1 or more attributes of 1 or more nodes.
Method	Call()	This service is used to call (invoke) a list of methods.
MonitoredItems	CreateMonitoredItems()	This service is used to create and add 1 or more MonitoredItems to a subscription.
	DeleteMonitoredItems()	This service is used to remove 1 or more MonitoredItems of a subscription.
	ModifyMonitoredItems()	This service is used to modify MonitoredItems of a subscription. Changes to the MonitoredItem settings shall be applied immediately by the Server. They take effect when practical but not later than twice the new revisedSamplingInterval.
	SetMonitoringMode()	This service is used to set the monitoring mode for 1 or more MonitoredItems of a subscription.
	SetTriggering()	This service is used to create and delete triggering links for a triggering item.
Subscription	CreateSubscription()	This service is used to create a subscription. Subscriptions monitor a set of MonitoredItems for notifications and return them to the client in response to publish requests.
	ModifySubscription()	This service is used to modify a subscription.
	SetPublishingMode()	This service is used to enable sending of notifications on 1 or more subscriptions.
	Publish()	This service is used for 2 purposes: • To acknowledge the receipt of NotificationMessages for 1 or more subscriptions. • To request the server to return a NotificationMessage or a keep-alive message. Since publish requests are not directed to a specific subscription, they may be used by any subscription.
	Republish()	This service requests the subscription to republish a NotificationMessage from its retransmission queue. If the server does not have the requested message in its retransmission queue, it returns an error response.
	DeleteSubscriptions()	This service is invoked to delete 1 or more subscriptions that belong to the client's session.
	TransferSubscriptions()	This service is used to transfer a subscription and its MonitoredItems from 1 session to another. For example, a client may need to reopen a session and then transfer its subscriptions to that session. It may also be used by 1 client to take over a subscription from another client by transferring the subscription to its session.

2.2.3 Information Models

iC7 series OPC UA OS7UC supports namespaces listed in Table 7.

Table 7: Supported Information Models

Information model	Namespace	Specification
OPC UA	http://opcfoundation.org/UA/	–
Device integration	http://opcfoundation.org/UA/DI/	OPC 10000-100 Devices
Machinery	http://opcfoundation.org/UA/Machinery/	OPC 40001-1 Machinery Basic Building Blocks

2.3 OPC Standard

2.3.1 OPC Technologies

OPC ranges different technologies:

- OPC Classic
- OPC Unified Architecture
- OPC UA Field eXchange

The iC7 series OPC UA OS7UC supports the OPC UA protocol used to communicate from Device to Compute.

OPC UA is intended to be used for the following use cases:

- Controller-to-Controller
- Controller-to-Compute
- Device-to-Compute

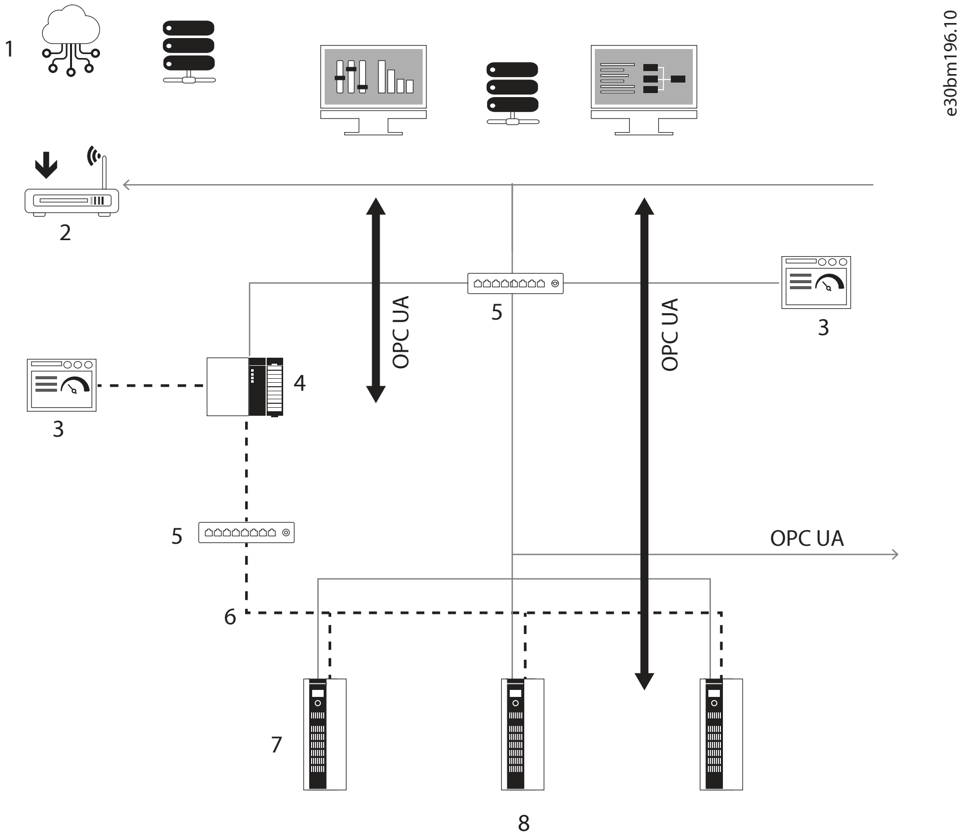


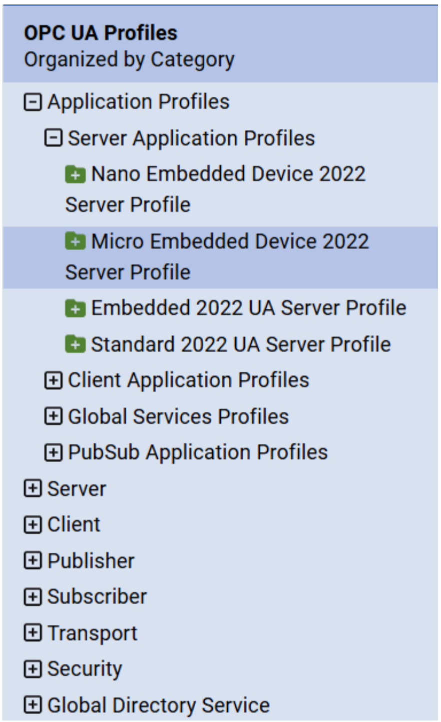
Figure 1: OPC UA Architecture in Applications with iC7 Drives

1	Cloud	**2**	OEM edge
3	HMI	**4**	PC
5	Switch	**6**	Configuring fieldbus
7	Sensors, I/Os, and other devices	**8**	iC7 drives

2.3.2 OPC UA Communication Model

Conformance units, also known as facets, in OPC UA server implementations define the specific features and functionalities supported by the server. The conformance units are defined by the OPC Foundation. For more information, see https://opcfoundation.org/.

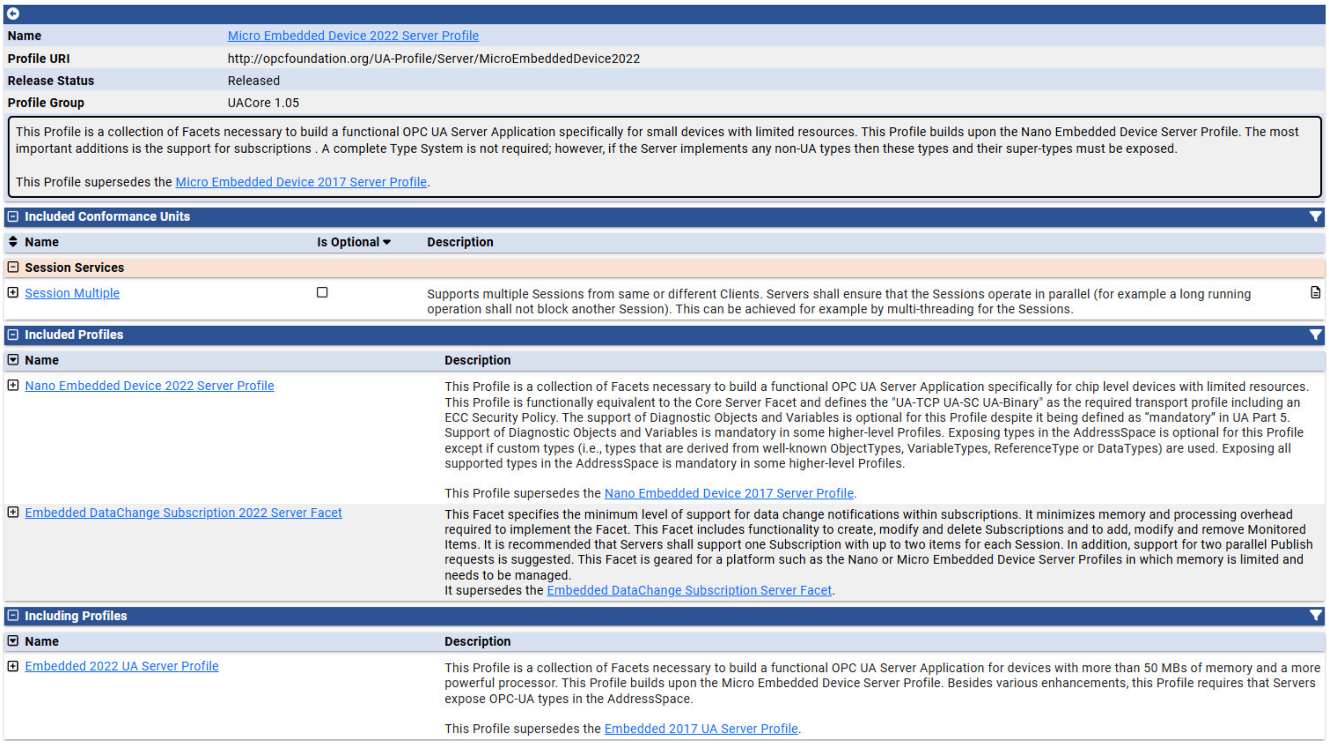
OPC UA profiles, such as the Micro Embedded Device 2022 Server Profile, define a selection of conformance units for certain devices. See Figure 2 and Figure 3.



OPC UA Profiles
Organized by Category

- ⊟ Application Profiles
  - ⊟ Server Application Profiles
    - ⊞ Nano Embedded Device 2022 Server Profile
    - ⊞ Micro Embedded Device 2022 Server Profile
    - ⊞ Embedded 2022 UA Server Profile
    - ⊞ Standard 2022 UA Server Profile
  - ⊞ Client Application Profiles
  - ⊞ Global Services Profiles
  - ⊞ PubSub Application Profiles
- ⊞ Server
- ⊞ Client
- ⊞ Publisher
- ⊞ Subscriber
- ⊞ Transport
- ⊞ Security
- ⊞ Global Directory Service

Figure 2: Example of OPC UA Profiles



Name	Micro Embedded Device 2022 Server Profile
Profile URI	http://opcfoundation.org/UA-Profile/Server/MicroEmbeddedDevice2022
Release Status	Released
Profile Group	UACore 1.05

This Profile is a collection of Facets necessary to build a functional OPC UA Server Application specifically for small devices with limited resources. This Profile builds upon the Nano Embedded Device Server Profile. The most important additions is the support for subscriptions . A complete Type System is not required; however, if the Server implements any non-UA types then these types and their super-types must be exposed.

This Profile supersedes the Micro Embedded Device 2017 Server Profile.

Included Conformance Units

Name	Is Optional	Description
Session Services		
Session Multiple	□	Supports multiple Sessions from same or different Clients. Servers shall ensure that the Sessions operate in parallel (for example a long running operation shall not block another Session). This can be achieved for example by multi-threading for the Sessions.

Included Profiles

Name	Description
Nano Embedded Device 2022 Server Profile	This Profile is a collection of Facets necessary to build a functional OPC UA Server Application specifically for chip level devices with limited resources. This Profile is functionally equivalent to the Core Server Facet and defines the "UA-TCP UA-SC UA-Binary" as the required transport profile including an ECC Security Policy. The support of Diagnostic Objects and Variables is optional for this Profile despite it being defined as "mandatory" in UA Part 5. Support of Diagnostic Objects and Variables is mandatory in some higher-level Profiles. Exposing types in the AddressSpace is optional for this Profile except if custom types (i.e., types that are derived from well-known ObjectTypes, VariableTypes, ReferenceType or DataTypes) are used. Exposing all supported types in the AddressSpace is mandatory in some higher-level Profiles. This Profile supersedes the Nano Embedded Device 2017 Server Profile.
Embedded DataChange Subscription 2022 Server Facet	This Facet specifies the minimum level of support for data change notifications within subscriptions. It minimizes memory and processing overhead required to implement the Facet. This Facet includes functionality to create, modify and delete Subscriptions and to add, modify and remove Monitored Items. It is recommended that Servers shall support one Subscription with up to two items for each Session. In addition, support for two parallel Publish requests is suggested. This Facet is geared for a platform such as the Nano or Micro Embedded Device Server Profiles in which memory is limited and needs to be managed. It supersedes the Embedded DataChange Subscription Server Facet.

Including Profiles

Name	Description
Embedded 2022 UA Server Profile	This Profile is a collection of Facets necessary to build a functional OPC UA Server Application for devices with more than 50 MBs of memory and a more powerful processor. This Profile builds upon the Micro Embedded Device Server Profile. Besides various enhancements, this Profile requires that Servers expose OPC-UA types in the AddressSpace. This Profile supersedes the Embedded 2017 UA Server Profile.

e30bm626.10

Figure 3: Example of Conformance Units in an OPC UA Profile

2.3.3 OPC UA Information Models

Each server supports data through information models. Information models are defined at different levels. Figure 4 shows how the different types of information models are combined into products.

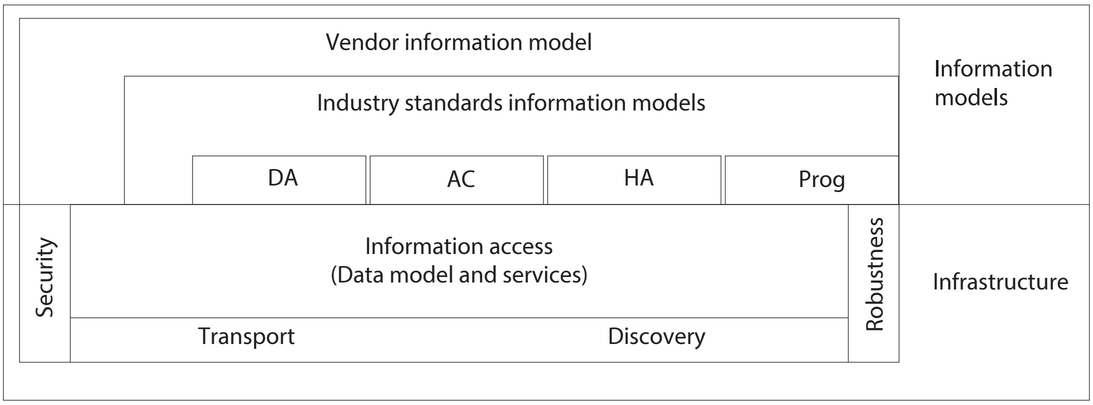


Figure 4: OPC UA Information Modeling

- Core information models define standard features of OPC UA, for example, device information (DI).
- Companion information models are typically defined by industries to standardize the data provided for machines.
- Vendor Specific Extensions define vendor-specific behavior that is not covered by core information models or companion information models.

3 Configuration

3.1 Prerequisites

Make sure that the following requirements are met:

- The system clock is set to a valid time. For more information, refer to the application guide of the application software installed on the drive.
- UaGds Configuration Tool version 1.1.0 or newer is installed.
- The user account has the SecurityAdmin role. For more information on user accounts, see 3.2.1 User Management.

3.2 Managing Users in MyDrive® Insight

3.2.1 User Management

User management is done in MyDrive® Insight. Only the functionality related to users in OPC UA is in the scope of this guide. For details on user management in general, see *MyDrive® Insight Application Guide*. For information on the cybersecurity features of iC7 drives, see Cybersecurity for iC7-Automation Frequency Converters and Cybersecurity for iC7 System Products.

Clients that connect using OPC UA are divided into 2 groups:

- When connecting to the drive, all users are considered ***Anonymous*** until an authentication handshake has been executed.
- When the authentication is completed successfully, the user transitions from ***Anonymous*** to ***AuthenticatedUser*** as shown in Figure 5. All users with the type AuthenticatedUser are allowed to modify their own password.

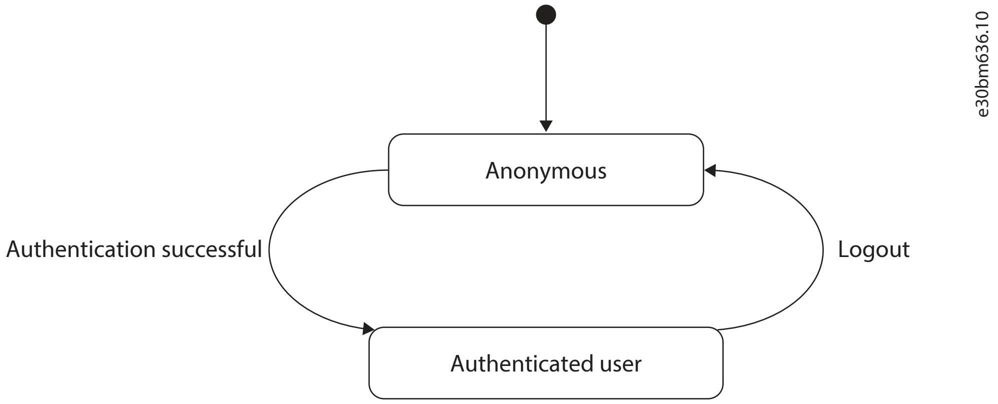


Figure 5: OPC UA User Types

Table 8: OPC UA User Types

User type	Description	Conformance units
Anonymous	A user that is not yet authenticated.	Security Role Well Known Group 2
AuthenticatedUser	A user that has authenticated and is known to the device.	Security Role Well Known Group 2

Accounts are available for authenticated users. Each account can be assigned certain roles which elevate the rights of the user when logged in (authenticated). The supported roles are explained in Table 9.

Table 9: OPC UA User Roles and Accounts

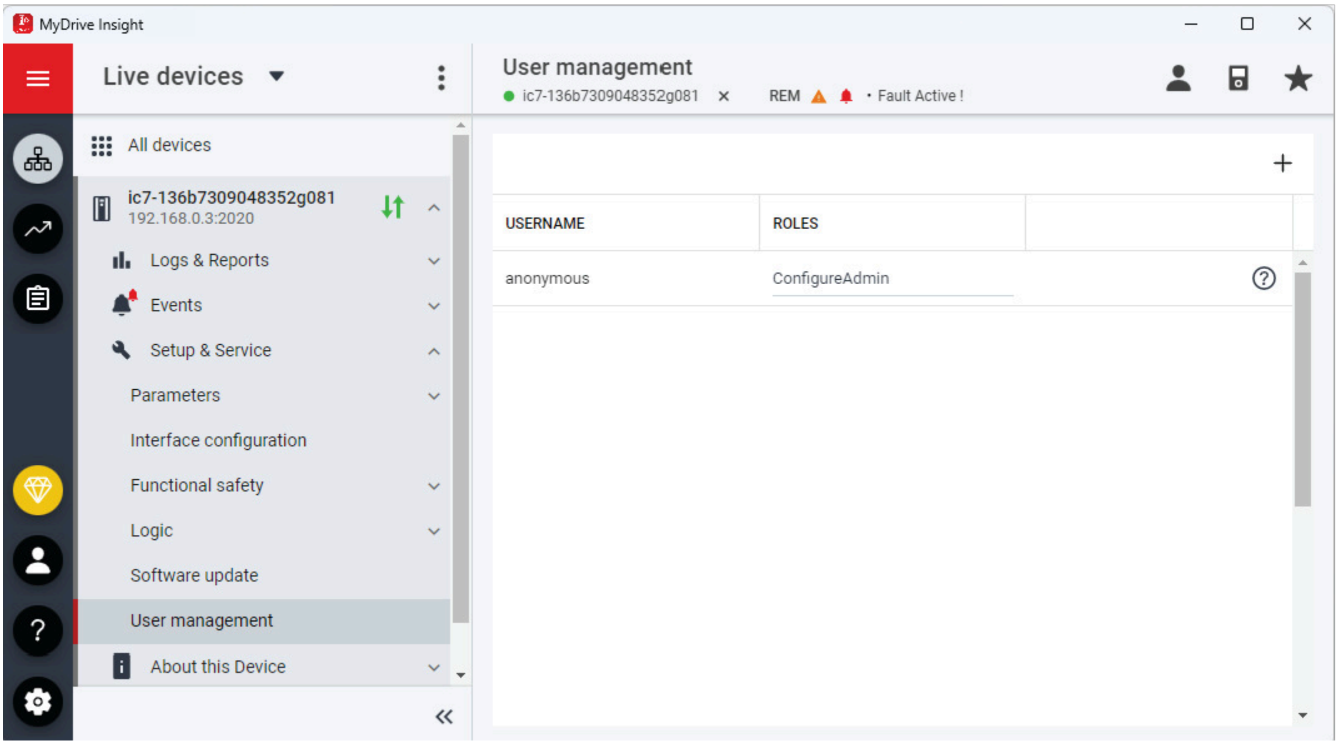
Role	Description	Conformance units
SafetyAdmin	The role is allowed to modify safety-related settings.	–
SecurityAdmin	The role is allowed to change security-related settings, manage certificates, and edit the roles of other users.	Security Role Well Known
ConfigureAdmin	The role is allowed to change configuration settings that are not related to security.	Security Role Well Known

By default, the Admin user is assigned with all roles, and is allowed to modify all OPC UA-related settings. Creating users with the required roles is recommended. For more information, see 3.2.2 Adding and Modifying Users.

To ensure that a user not requiring security is affected by security settings, the default setting for guest users (Anonymous) is to include the ConfigureAdmin role, which enables users to configure the drive except for safety and security settings. After the required users have been created, removing the ConfigureAdmin role for Anonymous users is recommended.

3.2.2 Adding and Modifying Users

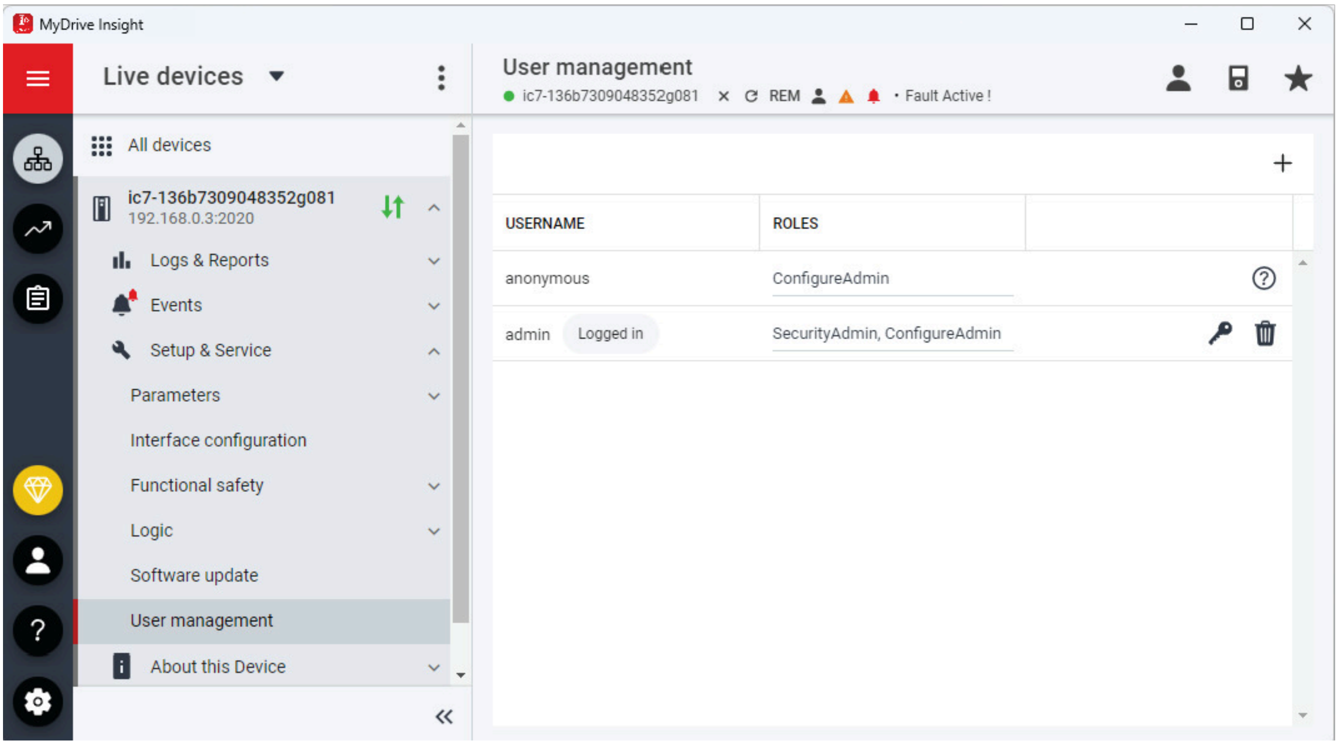
When accessing the drive for the first time, the user type is Anonymous.



USERNAME	ROLES
anonymous	ConfigureAdmin

Figure 6: Accessing User Management as Anonymous

To elevate to a role that is allowed to add, modify, and delete users, logging in as a user with the SecurityAdmin role is required.

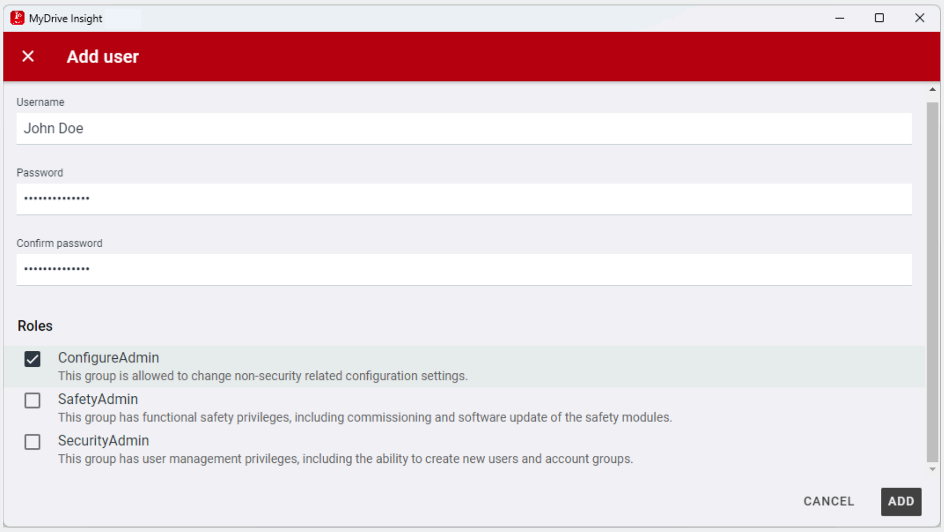


USERNAME	ROLES
anonymous	ConfigureAdmin
admin Logged in	SecurityAdmin, ConfigureAdmin

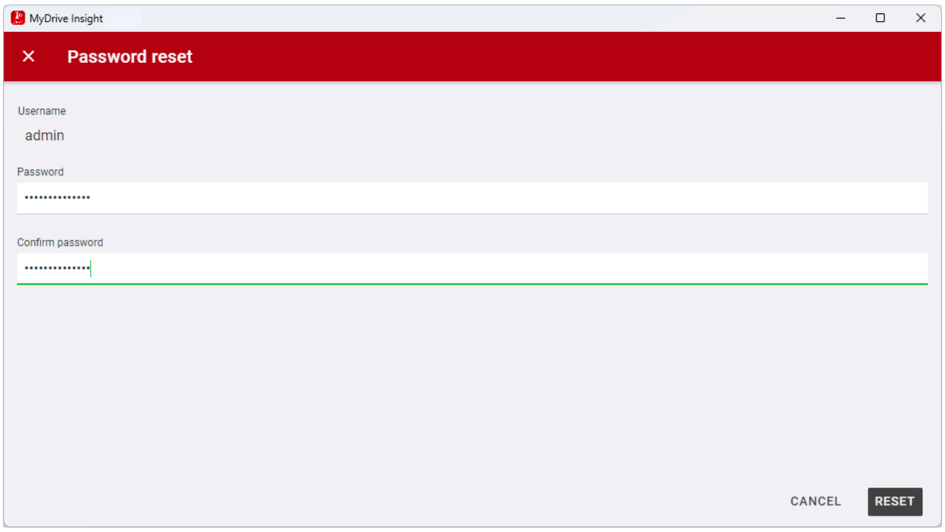
Figure 7: Accessing User Management as Admin

All users with the type AuthenticatedUser are allowed to modify their own password.

1. To see all users of the device, log in as a user with the SecurityAdmin role.
2. To add a user, select the + icon in the upper right corner.

> ➡ In the *Add user* dialog, enter the details for the new user. Selecting only the roles required by the user is recommended. Additional roles can be added later by any user with the SecurityAdmin role.
>
> 
>
>
> Username: John Doe
>
> Password: ••••••••••••••
>
> Confirm password: ••••••••••••••
>
> Roles
>
> ☑ ConfigureAdmin
> This group is allowed to change non-security related configuration settings.
>
> ☐ SafetyAdmin
> This group has functional safety privileges, including commissioning and software update of the safety modules.
>
> ☐ SecurityAdmin
> This group has user management privileges, including the ability to create new users and account groups.
>
> Figure 8: Adding User Details

3. To delete a user, select the bin icon next to the user (see Figure 7).
4. To change the password for a user, select the key symbol next to the user.



MyDrive Insight

Password reset

Username
admin

Password
••••••••••••••

Confirm password
••••••••••••••

Figure 9: Resetting a Password

Changing the password does not close active connections, and is effective the next time a connection is established.

> **IMPORTANT:** When restoring factory settings, the preconfigured user accounts are reverted to original settings, and any additional users that have been added to the device during configuration are removed.

3.3 Configuring the OPC UA Connection

3.3.1 Configuring OPC UA

OPC UA parameters are in parameter group *10 Connectivity* > *Protocols* > *OPC UA*.

1. In MyDrive®® Insight or the control panel, navigate to *10 Connectivity* > *Protocols* > *OPC UA* > *Configuration*.
2. In parameter ***10.3.6.2.1 Interface Selection***, select the interface for OPC UA.

Table 10: Parameter for OPC UA Interface Selection

Parameter index number	Parameter name	Parameter number	Selections	Description
10.3.6.2.1	***Interface Selection***	7086	• ***None*** • ***X0*** (default) • ***X1/X2***	Select the interface for OPC UA. The selection list depends on the available interfaces capable of running OPC UA. Use ***None*** to disable OPC UA.

3. In parameter ***10.3.6.2.2 Reverse Connect URL***, set the OPC UA reverse connection URL.

The parameter is used to define the client receiving reverse connections.

Table 11: Parameter for Reverse Connect URL

Parameter index number	Parameter name	Parameter number	Description
10.3.6.2.2	***Reverse Connect URL***	7085	Set OPC UA reverse connection URL. Clear to remove the reverse connection.

A valid URL contains the OPC scheme, a port number, and a path: [opc_scheme://]fqdn[:port_no][path]

Square brackets indicate optional segments in the URL.

Table 12: Reverse Connect URL Elements

Element	Description
opc_scheme	opc_scheme allows opc.tcp.
port_no	port_no allows values 1–65535.
path	path is any valid path starting with and constructed using slashes (/). Backslash (\) is not supported.

Examples of valid URLs:

- opc.tcp://somehost.example.com:1234/path/to
- opc.tcp://somehost:1234/path/to
- opc.tcp://somehost:1234
- opc.tcp://somehost
- somehost:1234/path/to
- somehost.example.com:1234
- somehost

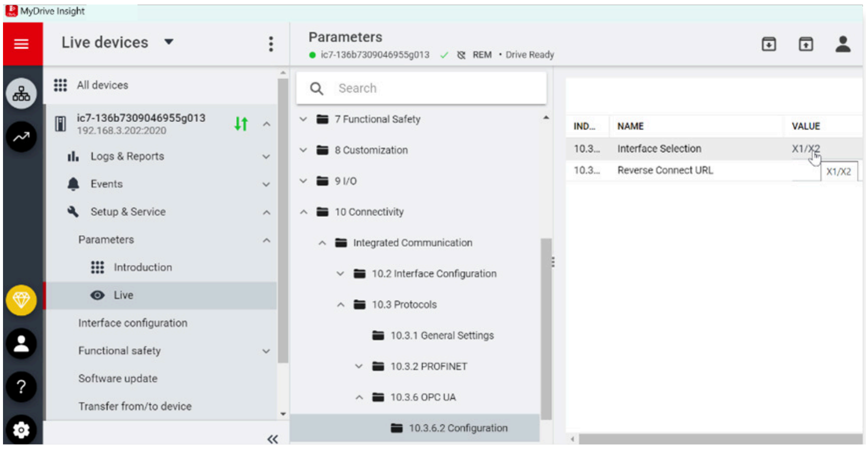
3.3.2 Establishing an OPC UA Connection

Prerequisite: For information on the location of the Ethernet connectors, refer to the product-specific design or installation guide. To use OPC UA, the drive must be ordered with OPC UA OS7UC (+BBUC).

OPC UA can be used on the selected Ethernet connectors. Depending on the Ethernet port usage of the drive, OPC UA use may be restricted to port X0. Establish the connection using a routable IP address (DHCP or static).

The OPC UA client shown in the examples in this guide is UaExpert. For more information on using UaExpert, see https://www.unified-automation.com/. Any other OPC UA client can also be used to operate OPC UA OS7UC.

1. In MyDrive® Insight, select the connection.

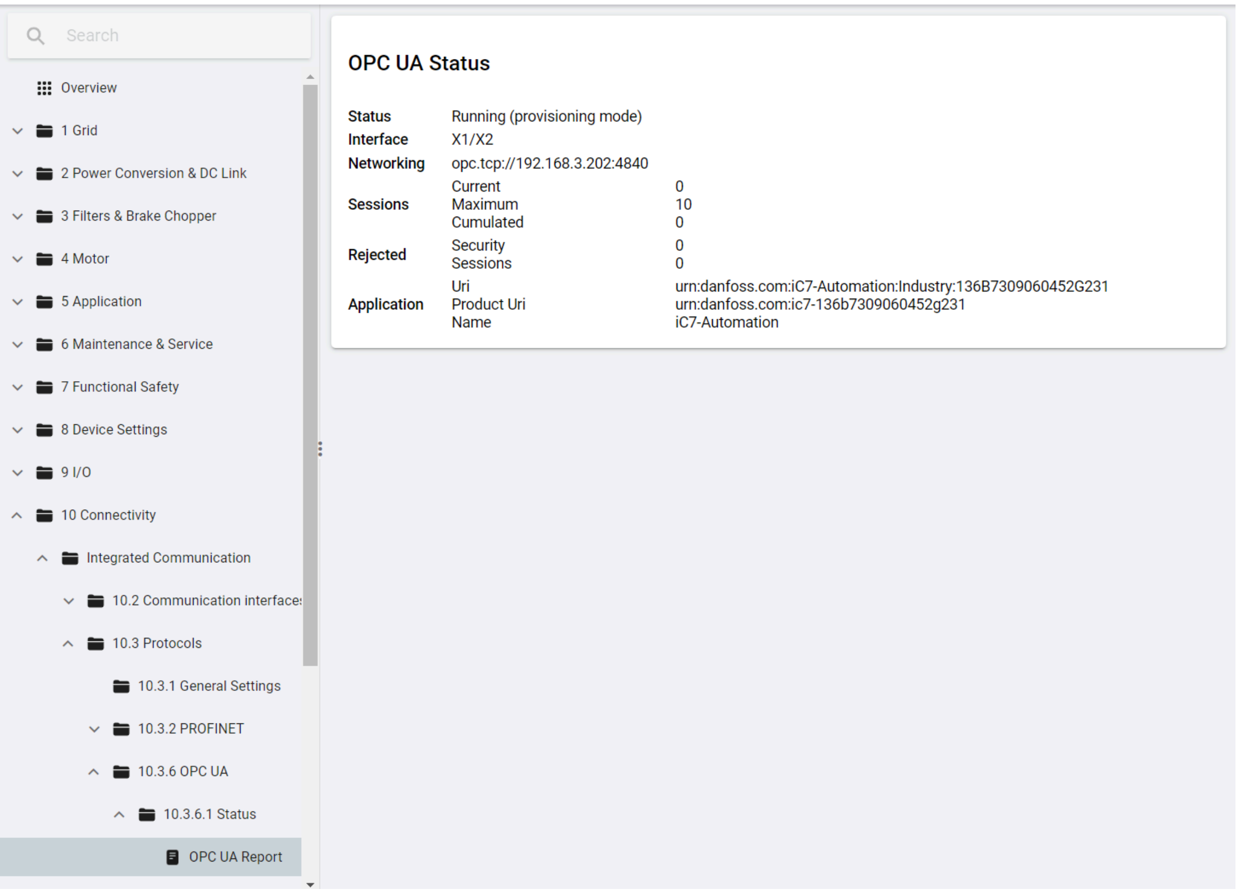


IND...	NAME	VALUE
10.3...	Interface Selection	X1/X2
10.3...	Reverse Connect URL	X1/X2

Figure 10: Selecting the Interface for OPC UA in MyDrive® Insight

2. Ensure that the server OPC UA status is showing as ***Running*** (provisioning mode).

> See Figure 12 for information on OPC UA status transitions.



OPC UA Status

Status	Running (provisioning mode)	
Interface	X1/X2	
Networking	opc.tcp://192.168.3.202:4840	
Sessions	Current Maximum Cumulated	0 10 0
Rejected	Security Sessions	0 0
Application	Uri Product Uri Name	urn:danfoss.com:iC7-Automation:Industry:136B7309060452G231 urn:danfoss.com:ic7-136b7309060452g231 iC7-Automation

Figure 11: OPC UA Status: Running

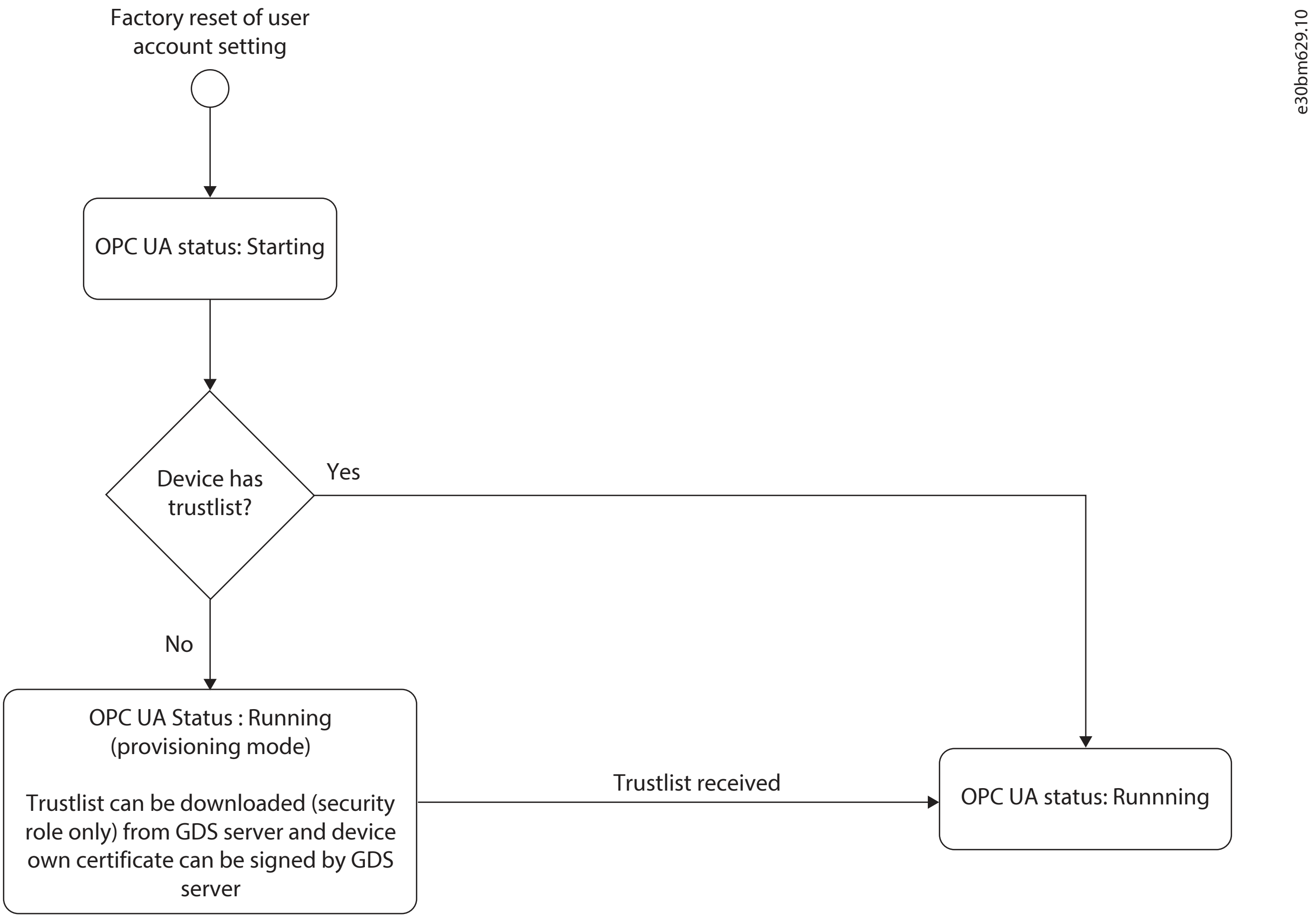

e30bm629.10
Factory reset of user account setting
OPC UA status: Starting
Device has trustlist?
Yes
No
OPC UA Status : Running (provisioning mode)
Trustlist can be downloaded (security role only) from GDS server and device own certificate can be signed by GDS server
Trustlist received
OPC UA status: Runnning

Figure 12: OPC UA Status Transitions

3. In UaExpert, select *Add Server*.

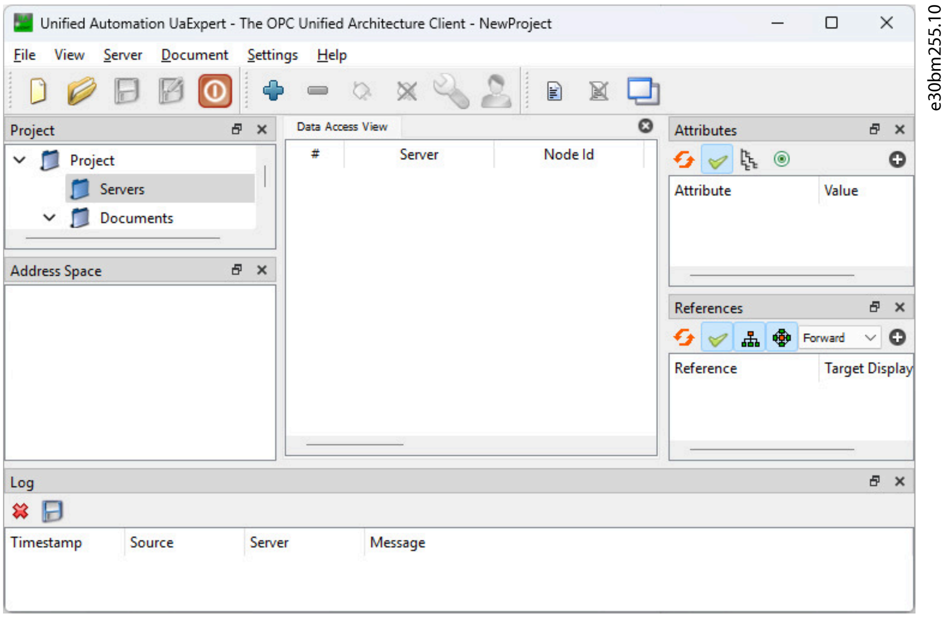


Figure 13: Adding a Server in UaExpert

4. Select *Custom Discovery*.

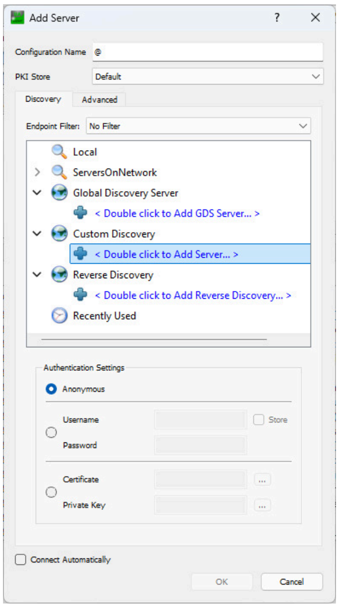
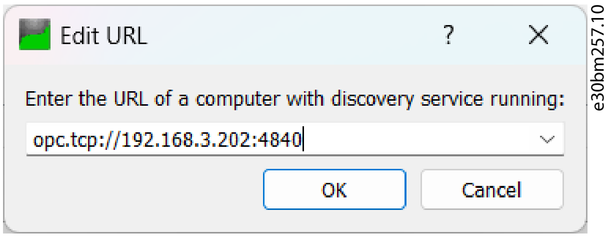


Figure 14: Using Custom Discovery in UaExpert

5. Enter the protocol, the IP address, and the port of the device (4840) and click *OK*.



Enter the URL of a computer with discovery service running:

opc.tcp://192.168.3.202:4840

Figure 15: Entering Connection Information in UaExpert

The server is added in UaExpert.

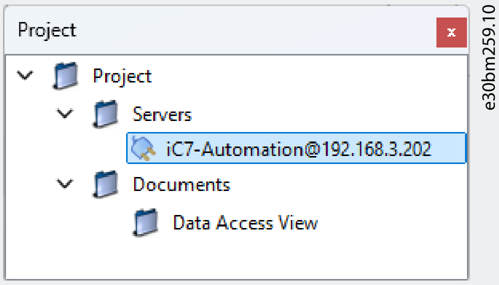
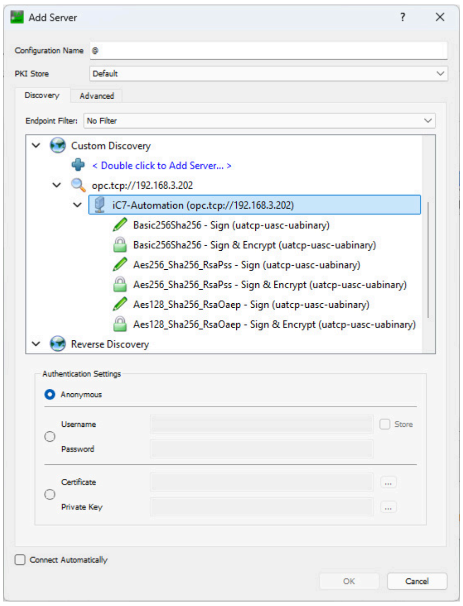


Figure 16: New Server in UaExpert

6. Expand the server and select the security profile to use.



Add Server

Configuration Name: @

PKI Store: Default

Endpoint Filter: No Filter

- Custom Discovery
  - < Double click to Add Server... >
  - opc.tcp://192.168.3.202
    - iC7-Automation (opc.tcp://192.168.3.202)
      - Basic256Sha256 - Sign (uatcp-uasc-uabinary)
      - Basic256Sha256 - Sign & Encrypt (uatcp-uasc-uabinary)
      - Aes256_Sha256_RsaPss - Sign (uatcp-uasc-uabinary)
      - Aes256_Sha256_RsaPss - Sign & Encrypt (uatcp-uasc-uabinary)
      - Aes128_Sha256_RsaOaep - Sign (uatcp-uasc-uabinary)
      - Aes128_Sha256_RsaOaep - Sign & Encrypt (uatcp-uasc-uabinary)
- Reverse Discovery

Authentication Settings

● Anonymous

○ Username / Password □ Store

○ Certificate / Private Key

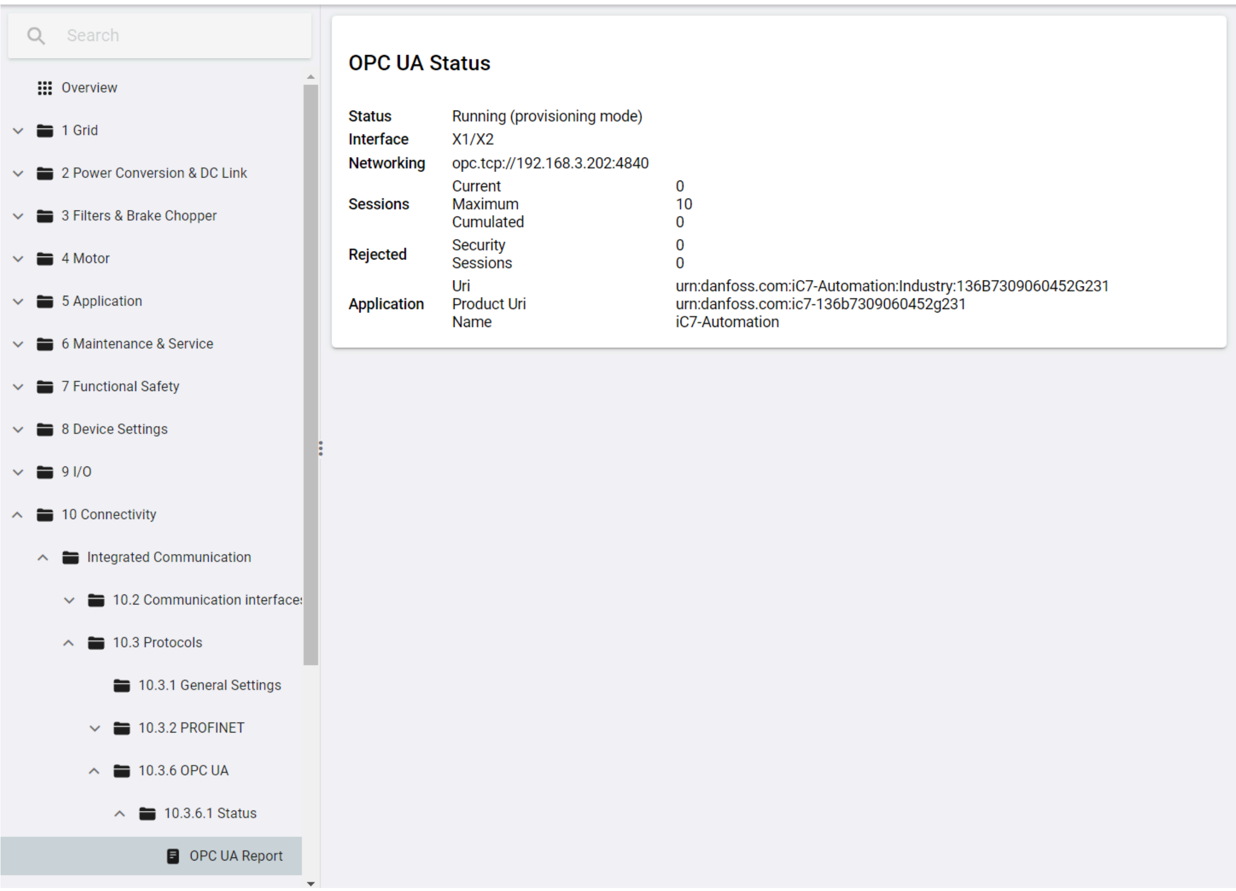
□ Connect Automatically

Figure 17: Selecting the Security Profile in UaExpert

3.3.3 Establishing Secure Connection using GDS Push

Prerequisite:

- Make sure that the system clock is set to a valid time. For more information, see the application guide.
- Install UaGds Configuration Tool version 1.1.0 or newer.
- Ensure that the server OPC UA status is showing as Running (provisioning mode) in MyDrive® Insight as shown in Figure 18.



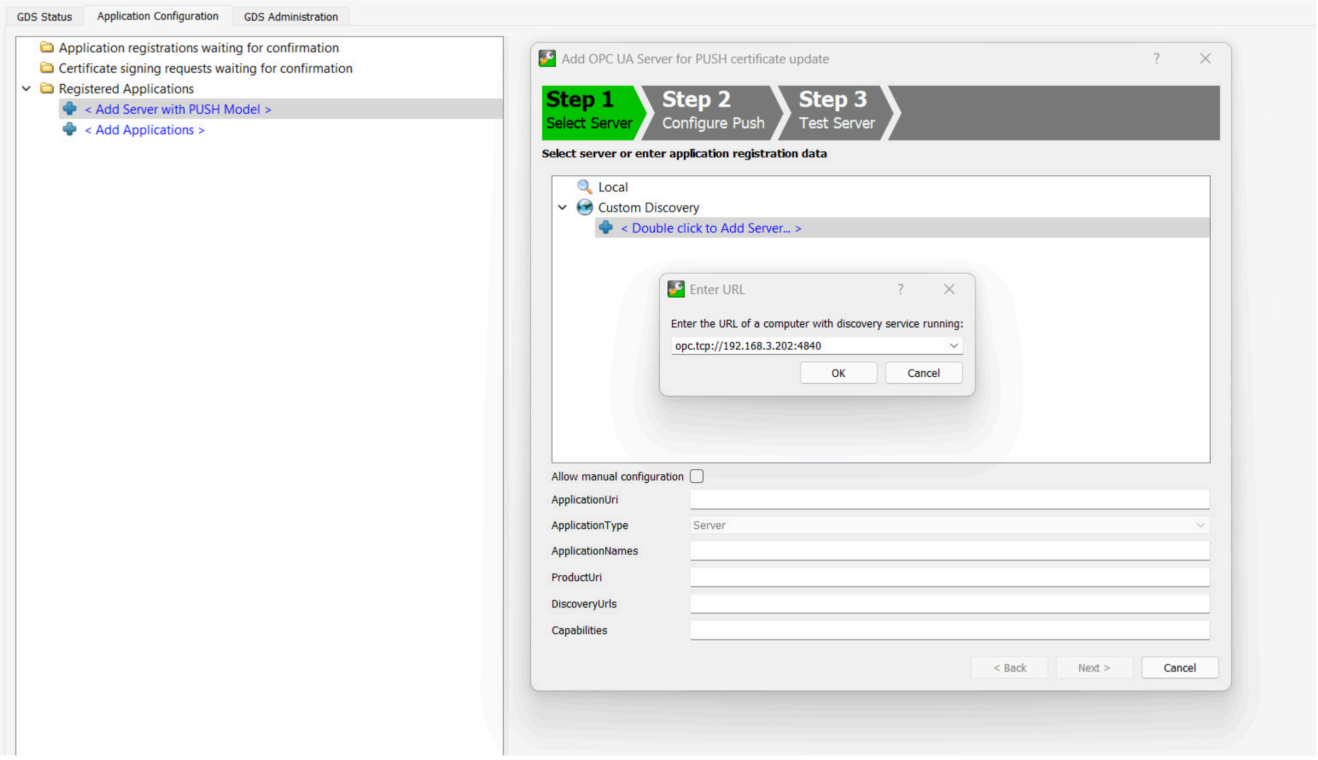
OPC UA Status

Status	Running (provisioning mode)	
Interface	X1/X2	
Networking	opc.tcp://192.168.3.202:4840	
Sessions	Current Maximum Cumulated	0 10 0
Rejected	Security Sessions	0 0
Application	Uri Product Uri Name	urn:danfoss.com:iC7-Automation:Industry:136B7309060452G231 urn:danfoss.com:ic7-136b7309060452g231 iC7-Automation

Figure 18: Checking OPC UA Status

- Make sure that the user account has the SecurityAdmin role.

1. Open UaGDS Configuration Tool and register the server by providing the IP address and port number. The IP address should match the OPC UA interface selected in MyDrive® Insight.



e30bm630.10

GDS Status
Application Configuration
GDS Administration
Application registrations waiting for confirmation
Certificate signing requests waiting for confirmation
Registered Applications
< Add Server with PUSH Model >
< Add Applications >

Add OPC UA Server for PUSH certificate update

Step 1 Select Server
Step 2 Configure Push
Step 3 Test Server

Select server or enter application registration data

Local
Custom Discovery
< Double click to Add Server... >

Enter URL

Enter the URL of a computer with discovery service running:

opc.tcp://192.168.3.202:4840

Allow manual configuration □

ApplicationUri

ApplicationType: Server

ApplicationNames

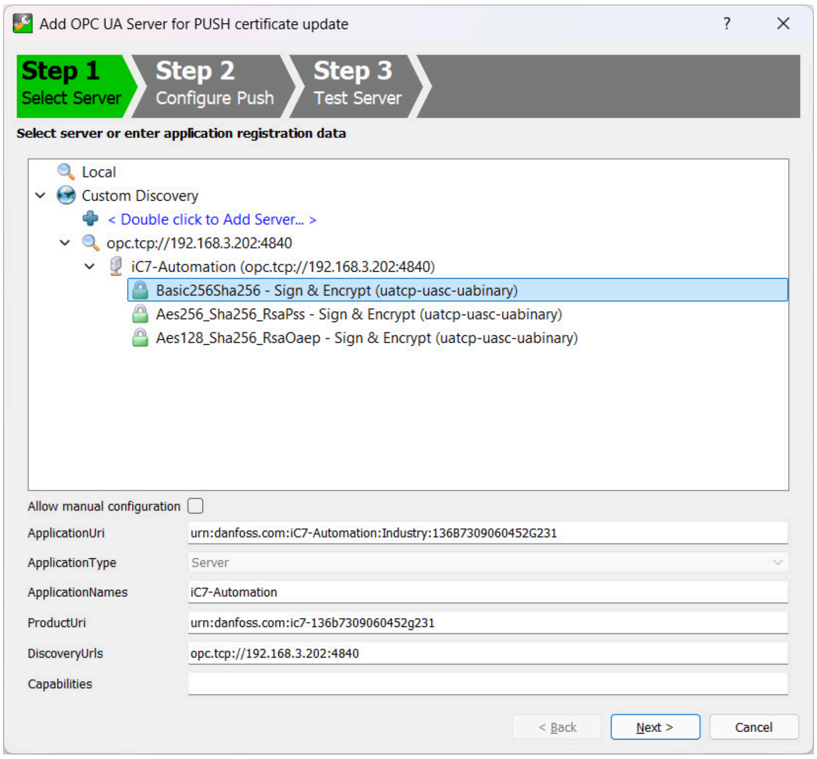
ProductUri

DiscoveryUrls

Capabilities

Figure 19: Registering the Server

2. Select 1 of the available secure connections and click *Next*.



e30bm631.10

Add OPC UA Server for PUSH certificate update

Select server or enter application registration data

opc.tcp://192.168.3.202:4840

iC7-Automation (opc.tcp://192.168.3.202:4840)

Basic256Sha256 - Sign & Encrypt (uatcp-uasc-uabinary)

Aes256_Sha256_RsaPss - Sign & Encrypt (uatcp-uasc-uabinary)

Aes128_Sha256_RsaOaep - Sign & Encrypt (uatcp-uasc-uabinary)

Allow manual configuration □

ApplicationUri: urn:danfoss.com:iC7-Automation:Industry:136B7309060452G231

ApplicationType: Server

ApplicationNames: iC7-Automation

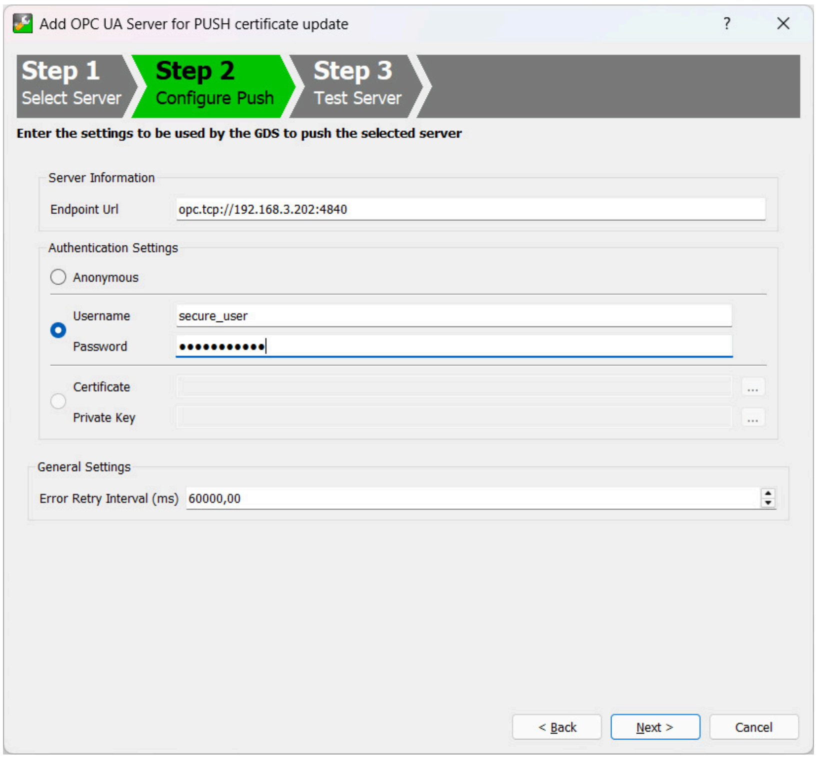
ProductUri: urn:danfoss.com:ic7-136b7309060452g231

DiscoveryUrls: opc.tcp://192.168.3.202:4840

Capabilities

Figure 20: Selecting a Connection

3. Enter the username of a user with the SecurityAdmin role and the password of the server, and click *Next*.


Add OPC UA Server for PUSH certificate update

Enter the settings to be used by the GDS to push the selected server

Server Information

Endpoint Url: opc.tcp://192.168.3.202:4840

Authentication Settings

○ Anonymous

● Username: secure_user
Password: •••••••••••

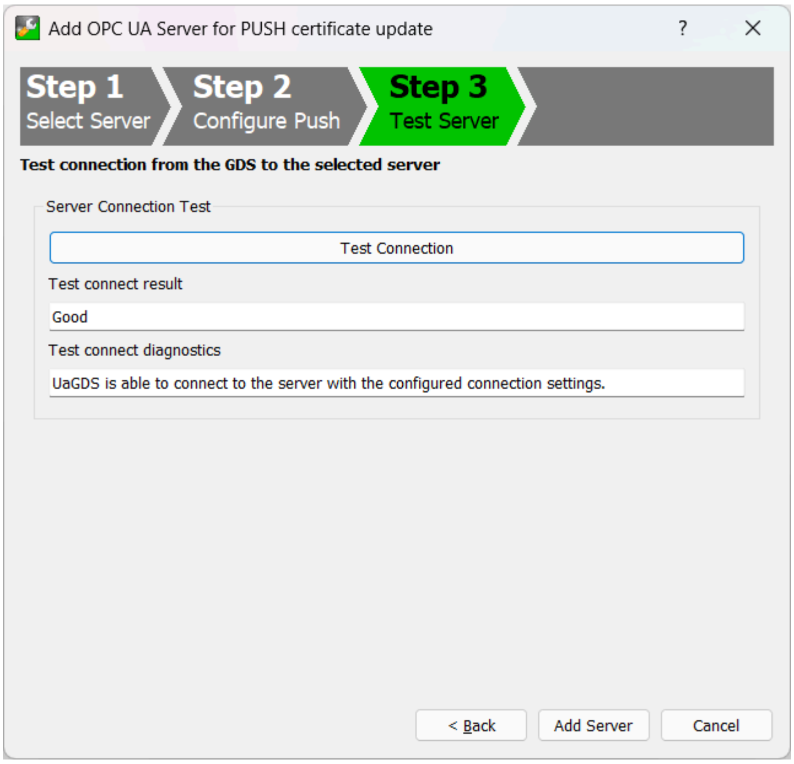
○ Certificate
Private Key

General Settings

Error Retry Interval (ms): 60000,00

Figure 21: Entering User Information

4. Click *Test Connection*, check that the *Test connect result* is *Good*, and click *Add Server*.


Add OPC UA Server for PUSH certificate update

Test connection from the GDS to the selected server

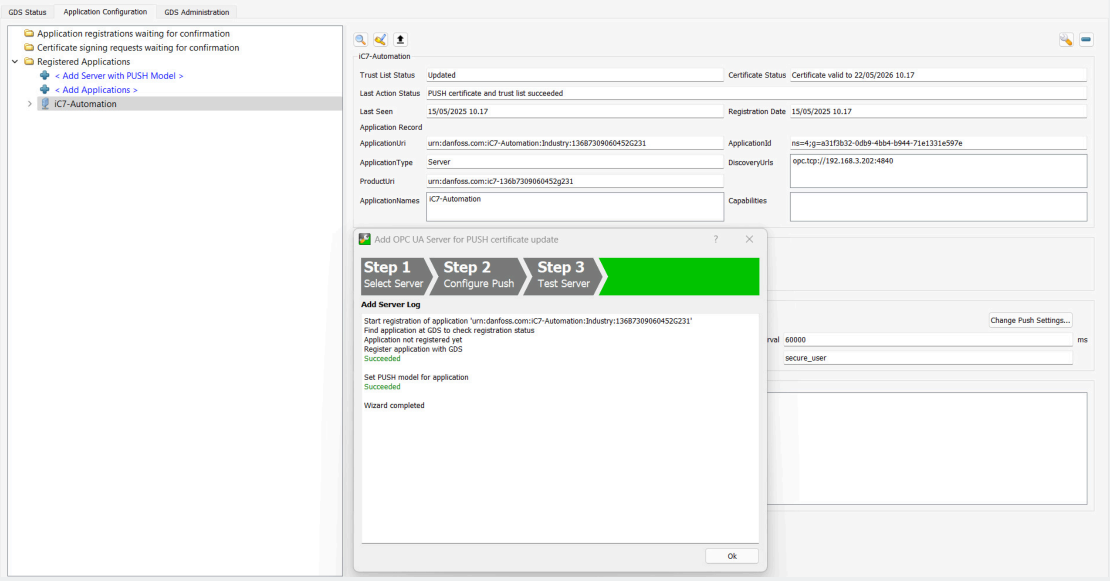
Server Connection Test

Test connect result: Good

Test connect diagnostics: UaGDS is able to connect to the server with the configured connection settings.

Figure 22: Testing the Connection

Ensure that the status for the register with UaGDS Configuration Tool is *Succeeded*.



iC7-Automation

Trust List Status	Updated	Certificate Status	Certificate valid to 22/05/2026 10.17
Last Action Status	PUSH certificate and trust list succeeded		
Last Seen	15/05/2025 10.17	Registration Date	15/05/2025 10.17
Application Record			
ApplicationUri	urn:danfoss.com:iC7-Automation:Industry:136B7309060452G231	ApplicationId	ns=4;g=a31f3b32-0db9-4bb4-b944-71e1331e597e
ApplicationType	Server	DiscoveryUrls	opc.tcp://192.168.3.202:4840
ProductUri	urn:danfoss.com:ic7-136b7309060452g231		
ApplicationNames	iC7-Automation	Capabilities	

rval 60000 ms

secure_user

Add OPC UA Server for PUSH certificate update

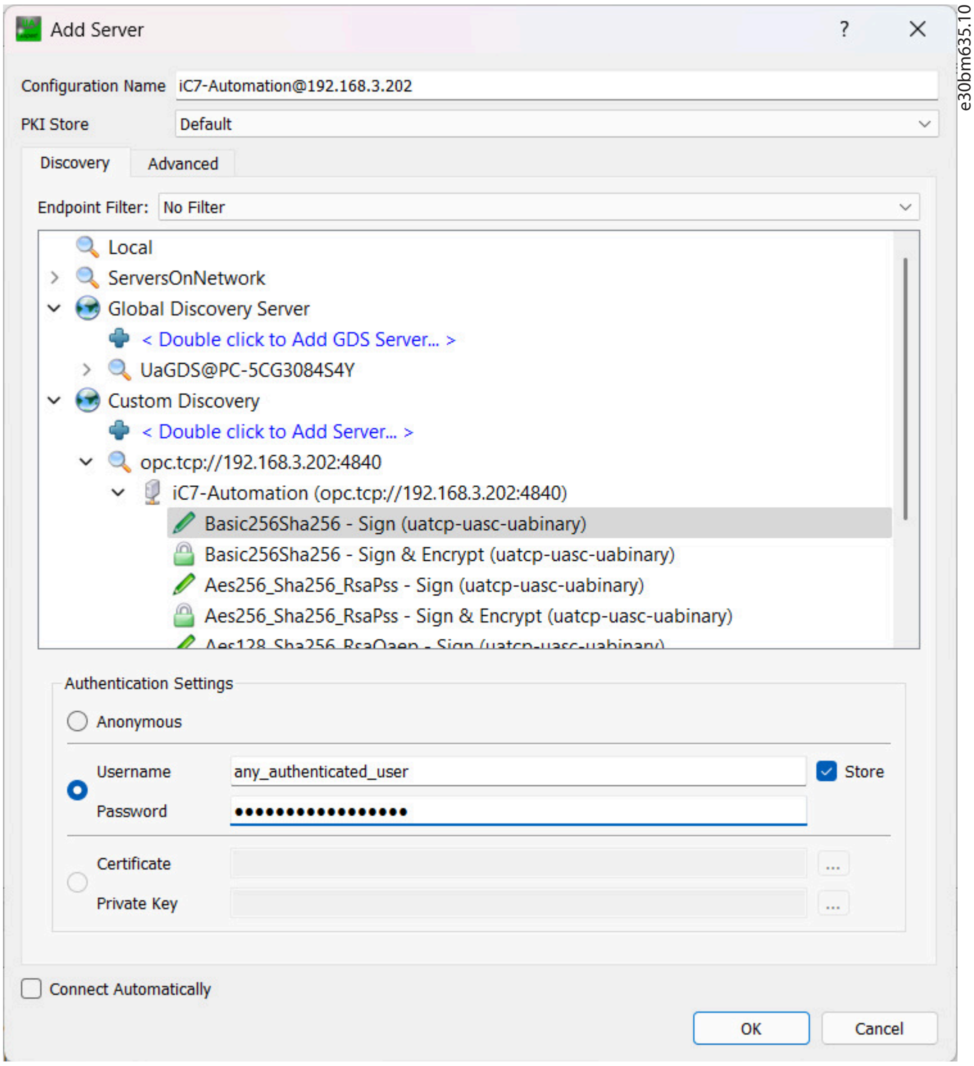
Add Server Log

```
Start registration of application 'urn:danfoss.com:iC7-Automation:Industry:136B7309060452G231'
Find application at GDS to check registration status
Application not registered yet
Register application with GDS
Succeeded

Set PUSH model for application
Succeeded

Wizard completed
```

Figure 23: Successful Connection to UaGDS

5. Using UaExpert as client, connect to the server with a trusted device using Global Discovery Server.

> The client must be part of the same PKI handled by the UaGDS Configuration Tool. Connecting to the server can be done as an authenticated user. No specific role is required.



Add Server

Configuration Name: iC7-Automation@192.168.3.202

PKI Store: Default

Discovery | Advanced

Endpoint Filter: No Filter

- Local
- ServersOnNetwork
- Global Discovery Server
  - < Double click to Add GDS Server... >
  - UaGDS@PC-5CG3084S4Y
- Custom Discovery
  - < Double click to Add Server... >
  - opc.tcp://192.168.3.202:4840
    - iC7-Automation (opc.tcp://192.168.3.202:4840)
      - Basic256Sha256 - Sign (uatcp-uasc-uabinary)
      - Basic256Sha256 - Sign & Encrypt (uatcp-uasc-uabinary)
      - Aes256_Sha256_RsaPss - Sign (uatcp-uasc-uabinary)
      - Aes256_Sha256_RsaPss - Sign & Encrypt (uatcp-uasc-uabinary)
      - Aes128_Sha256_RsaOaep - Sign (uatcp-uasc-uabinary)

Authentication Settings

○ Anonymous

● Username: any_authenticated_user ☑ Store
Password: •••••••••••••••••

○ Certificate / Private Key

□ Connect Automatically

Figure 24: Connecting to the Server

3.4 Asset Management

iC7 Series OPC UA OS7UC implements asset management according to the following specifications:

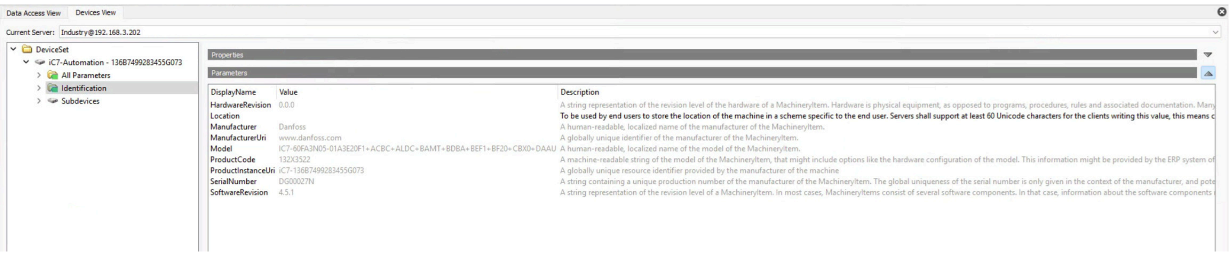
- OPC 10000-100 Devices
- OPC 40001-1 Machinery Basic Building Blocks

For details, refer to the OPC Foundation website at https://opcfoundation.org. The Machinery Basic Building Blocks specification defines a IMachineTagNameplateType which is based on the ITagNameplateType defined in OPC 10000-100.

The structure implements the following nodes:

- Hardware Revision
- Location
- Manufacturer
- ManufacturerUrl
- Model

- ProductCode
- ProductInstanceUri
- SerialNumber
- SoftwareRevision



Current Server: Industry@192.168.3.202

- DeviceSet
  - iC7-Automation - 136B7499283455G073
    - All Parameters
    - Identification
    - Subdevices

DisplayName	Value	Description
HardwareRevision	0.0.0	A string representation of the revision level of the hardware of a MachineryItem. Hardware is physical equipment, as opposed to programs, procedures, rules and associated documentation. Many
Location		To be used by end users to store the location of the machine in a scheme specific to the end user. Servers shall support at least 60 Unicode characters for the clients writing this value, this means c
Manufacturer	Danfoss	A human-readable, localized name of the manufacturer of the MachineryItem.
ManufacturerUri	www.danfoss.com	A globally unique identifier of the manufacturer of the MachineryItem.
Model	IC7-60FA3N05-01A3E20F1+ACBC+ALDC+BAMT+BDBA+BEF1+BF20+CBX0+DAAU	A human-readable, localized name of the model of the MachineryItem.
ProductCode	132X3522	A machine-readable string of the model of the MachineryItem, that might include options like the hardware configuration of the model. This information might be provided by the ERP system of
ProductInstanceUri	iC7-136B7499283455G073	A globally unique resource identifier provided by the manufacturer of the machine
SerialNumber	DG00027N	A string containing a unique production number of the manufacturer of the MachineryItem. The global uniqueness of the serial number is only given in the context of the manufacturer, and pote
SoftwareRevision	4.5.1	A string representation of the revision level of a MachineryItem. In most cases, MachineryItems consist of several software components. In that case, information about the software components

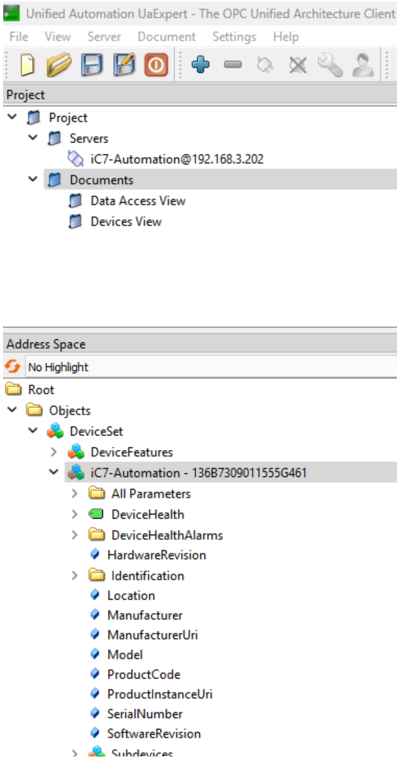
Figure 25: Example of Asset Information in UaExpert

The location node can be set when logged in. All other nodes are read-only.

3.5 Device Modeling

The iC7 drive is built as a modular, configurable drive, which can be complemented with 1 or more functional extension options. The number of functional extension option slots depends on the drive type and frame. For details on available option slots, refer to the product-specific guides.

In OPC UA, the main device is represented under the DeviceSet as shown in Figure 26.



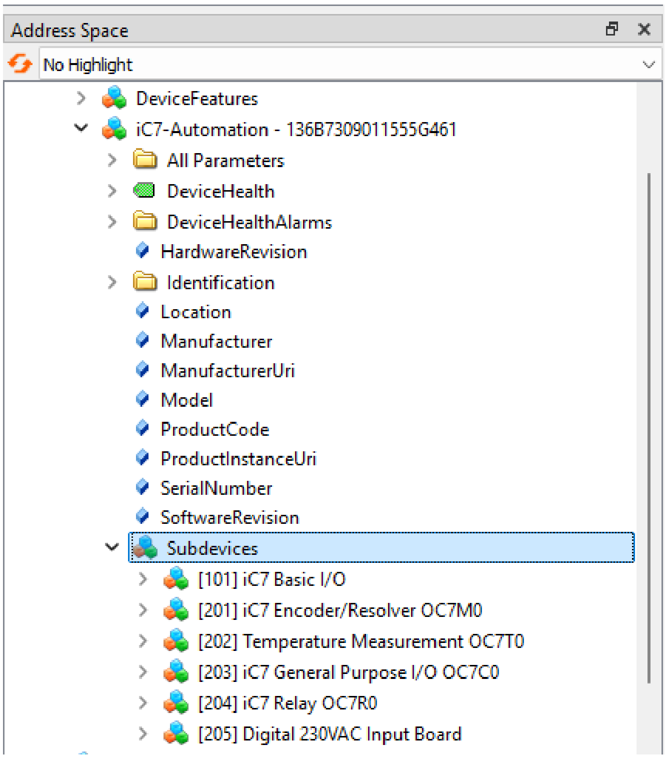
- Project
  - Servers
    - iC7-Automation@192.168.3.202
  - Documents
    - Data Access View
    - Devices View

- Root
- Objects
  - DeviceSet
    - DeviceFeatures
    - iC7-Automation - 136B7309011555G461
      - All Parameters
      - DeviceHealth
      - DeviceHealthAlarms
      - HardwareRevision
      - Identification
      - Location
      - Manufacturer
      - ManufacturerUri
      - Model
      - ProductCode
      - ProductInstanceUri
      - SerialNumber
      - SoftwareRevision
      - Subdevices

Figure 26: Example of DeviceSet

The DeviceSet contains all the information regarding the main components, such as the control unit and power unit, of the device.

When functional extension options, for example, the Basic I/O or General Purpose I/O option, are added to the device, they are listed under *Subdevices* as shown in Figure 27.

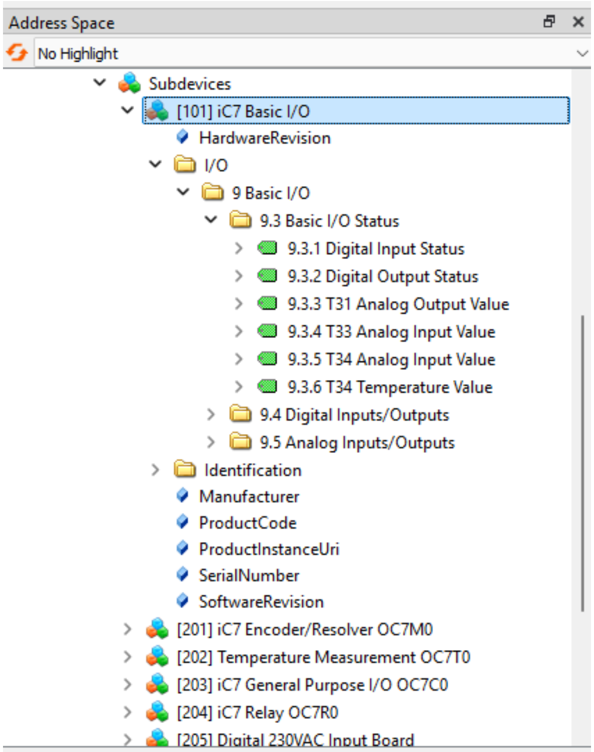


```
Address Space
No Highlight
    > DeviceFeatures
    v iC7-Automation - 136B7309011555G461
        > All Parameters
        > DeviceHealth
        > DeviceHealthAlarms
          HardwareRevision
        > Identification
          Location
          Manufacturer
          ManufacturerUri
          Model
          ProductCode
          ProductInstanceUri
          SerialNumber
          SoftwareRevision
        v Subdevices
            > [101] iC7 Basic I/O
            > [201] iC7 Encoder/Resolver OC7M0
            > [202] Temperature Measurement OC7T0
            > [203] iC7 General Purpose I/O OC7C0
            > [204] iC7 Relay OC7R0
            > [205] Digital 230VAC Input Board
```

e30bm646710

Figure 27: Subdevices View

Each functional extension in the device is listed under the *Subdevices* (see Figure 28). The number in the square brackets indicates the option slot number. Figure 28 shows an iC7-Automation drive with 6 functional extension options installed.



```
Address Space
No Highlight
    v Subdevices
        v [101] iC7 Basic I/O
              HardwareRevision
            v I/O
                v 9 Basic I/O
                    v 9.3 Basic I/O Status
                        > 9.3.1 Digital Input Status
                        > 9.3.2 Digital Output Status
                        > 9.3.3 T31 Analog Output Value
                        > 9.3.4 T33 Analog Input Value
                        > 9.3.5 T34 Analog Input Value
                        > 9.3.6 T34 Temperature Value
                    > 9.4 Digital Inputs/Outputs
                    > 9.5 Analog Inputs/Outputs
            > Identification
              Manufacturer
              ProductCode
              ProductInstanceUri
              SerialNumber
              SoftwareRevision
        > [201] iC7 Encoder/Resolver OC7M0
        > [202] Temperature Measurement OC7T0
        > [203] iC7 General Purpose I/O OC7C0
        > [204] iC7 Relay OC7R0
        > [205] Digital 230VAC Input Board
```

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Figure 28: Example Functional Extension Options in Subdevices

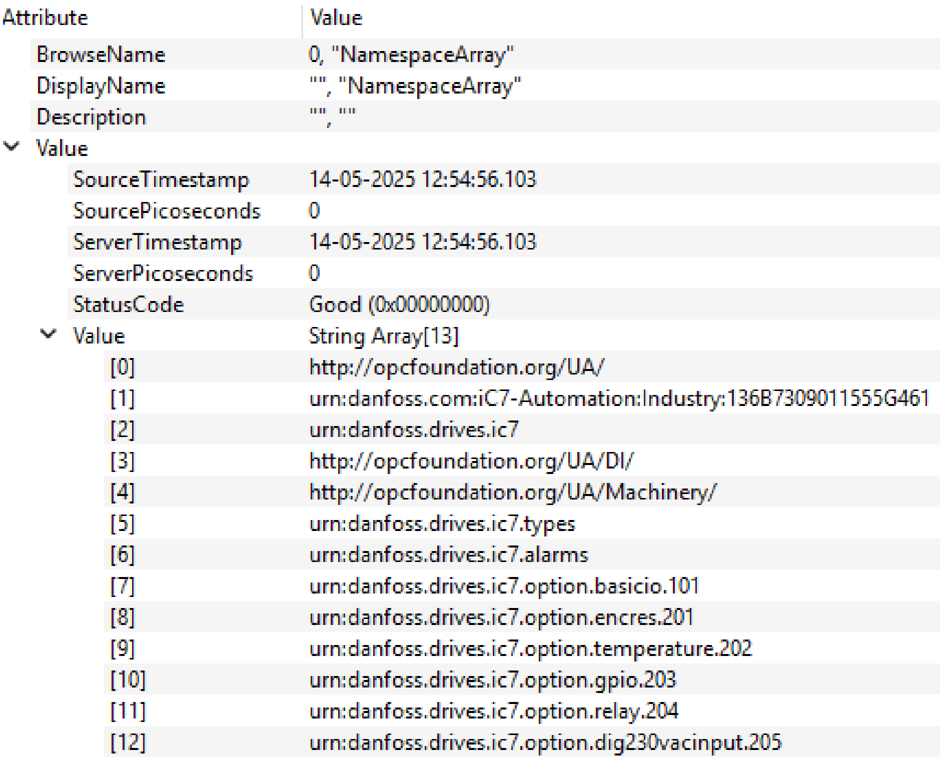
Information regarding the option can be found under the option itself. The information available for an option is structured in the same way as in the control panel or MyDrive® Insight.

3.6 Namespace

The namespace is a URI that identifies the naming authority responsible for assigning the identifier element of the NodeId. Naming authorities include the local Server, the underlying system, standards bodies, and consortia.

The iC7 drives consist of many namespaces. Some are based on standards from the OPC UA foundation, and some are vendor-specific for the specific device. See Figure 29 for an example of the NamespaceArray in iC7-Automation.

Figure 29: Namespace Array in iC7-Automation



Attribute	Value
BrowseName	0, "NamespaceArray"
DisplayName	"", "NamespaceArray"
Description	"", ""
Value	
SourceTimestamp	14-05-2025 12:54:56.103
SourcePicoseconds	0
ServerTimestamp	14-05-2025 12:54:56.103
ServerPicoseconds	0
StatusCode	Good (0x00000000)
Value	String Array[13]
[0]	http://opcfoundation.org/UA/
[1]	urn:danfoss.com:iC7-Automation:Industry:136B7309011555G461
[2]	urn:danfoss.drives.ic7
[3]	http://opcfoundation.org/UA/DI/
[4]	http://opcfoundation.org/UA/Machinery/
[5]	urn:danfoss.drives.ic7.types
[6]	urn:danfoss.drives.ic7.alarms
[7]	urn:danfoss.drives.ic7.option.basicio.101
[8]	urn:danfoss.drives.ic7.option.encres.201
[9]	urn:danfoss.drives.ic7.option.temperature.202
[10]	urn:danfoss.drives.ic7.option.gpio.203
[11]	urn:danfoss.drives.ic7.option.relay.204
[12]	urn:danfoss.drives.ic7.option.dig230vacinput.205

e30bm6461.10

The following namespace indexes refer to standards coming from the OPC UA foundation:

- Index 0: http://opcfoundation.org/UA/
- Index 3: http://opcfoundation.org/DI/
- Index4: http://opcfoundation.org/UA/Machinery/

The following namespace indexes refer to vendor-pecific implementation:

- Index 1: urn:danfoss.com:iC7-Automation:Industry:136B7309011555G461
- Index 2: urn:danfoss.drives.ic7
- Index 5: urn:danfoss.drives.ic7.types:
- Index 6: urn:danfoss.drives.ic7.alarms
- Index 7: urn:danfoss.drives.ic7.option.basicio.101

The indexes depend on the actual configuration of the device, for example, which slots functional extension options are mounted in.

3.7 Accessing Parameters

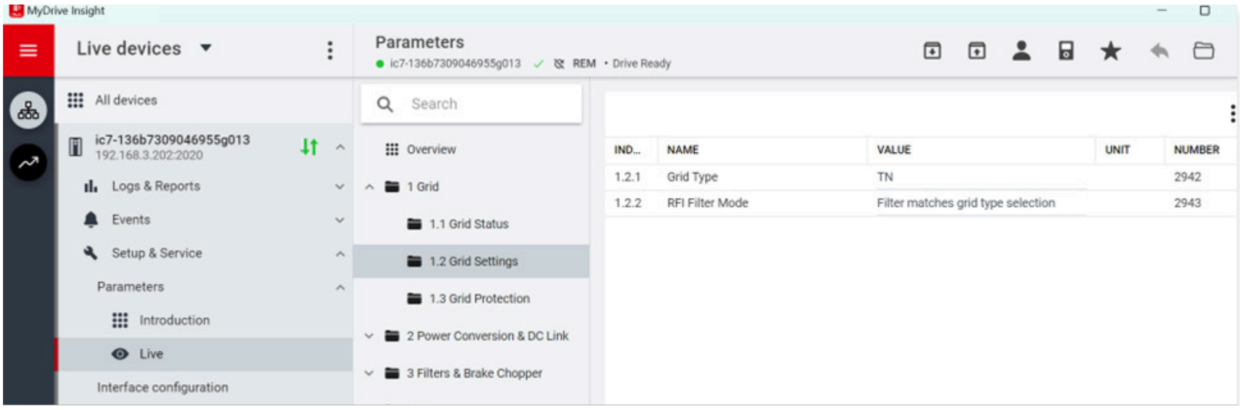
Prerequisite:

- When accessing parameters using OPC UA, it is recommended to allow access only for authorized users. For instructions on setting the correct access level, see 3.2.2 Adding and Modifying Users. For more information about user types, see 3.2.1 User Management.
- It is recommended that access is removed for anonymous users when using OPC UA.
- Ensure that a user with adequate user access exists in the system.

Logging in as a user with the ***ConfigureAdmin*** role is required to modify parameter settings.

Parameters are shown in UaExpert in a similar tree-view as in MyDrive® Insight. Nodes in the *All Parameters* view in UaExpert use the parameter number as node ID. To access a node via the OPC UA parameter view, use the parameter number that is shown in the MyDrive® Insight parameter view.

The instructions in this section describe logging in as a specific user.



IND...	NAME	VALUE	UNIT	NUMBER
1.2.1	Grid Type	TN		2942
1.2.2	RFI Filter Mode	Filter matches grid type selection		2943

Figure 30: Parameter View in MyDrive® Insight

1. In UaExpert, select *Change User*.

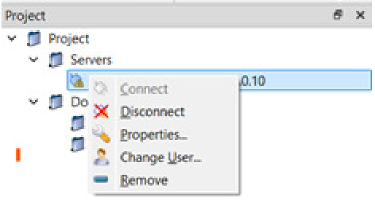
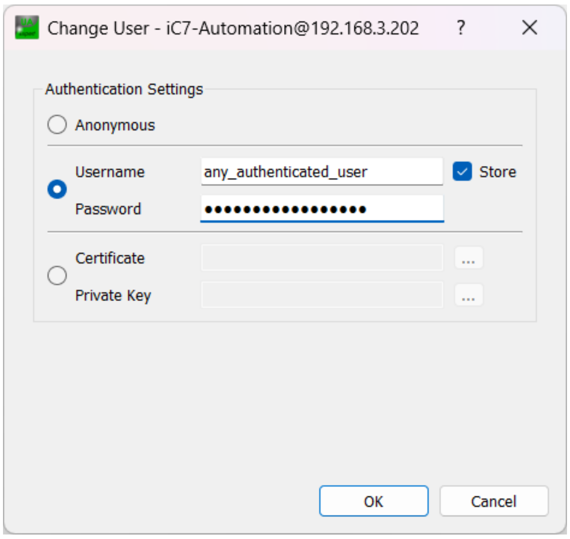


Figure 31: Logging into UaExpert

2. Use the authentication setting configured in MyDrive® Insight and enter the password.



Change User - iC7-Automation@192.168.3.202

Authentication Settings

○ Anonymous

● Username: any_authenticated_user ☑ Store

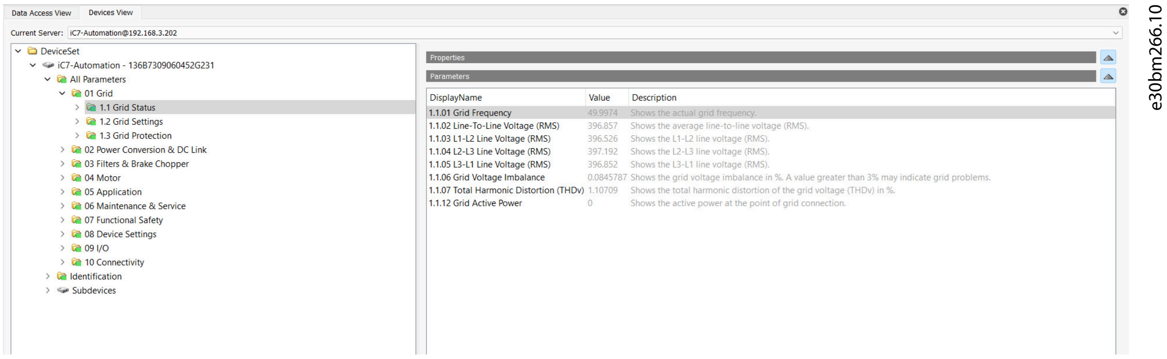
Password: ••••••••••••••••

○ Certificate:

Private Key:

Figure 32: Changing the User in UaExpert

3. To locate a parameter in UaExpert, navigate to the parameter in the tree-view under *All Parameters*.

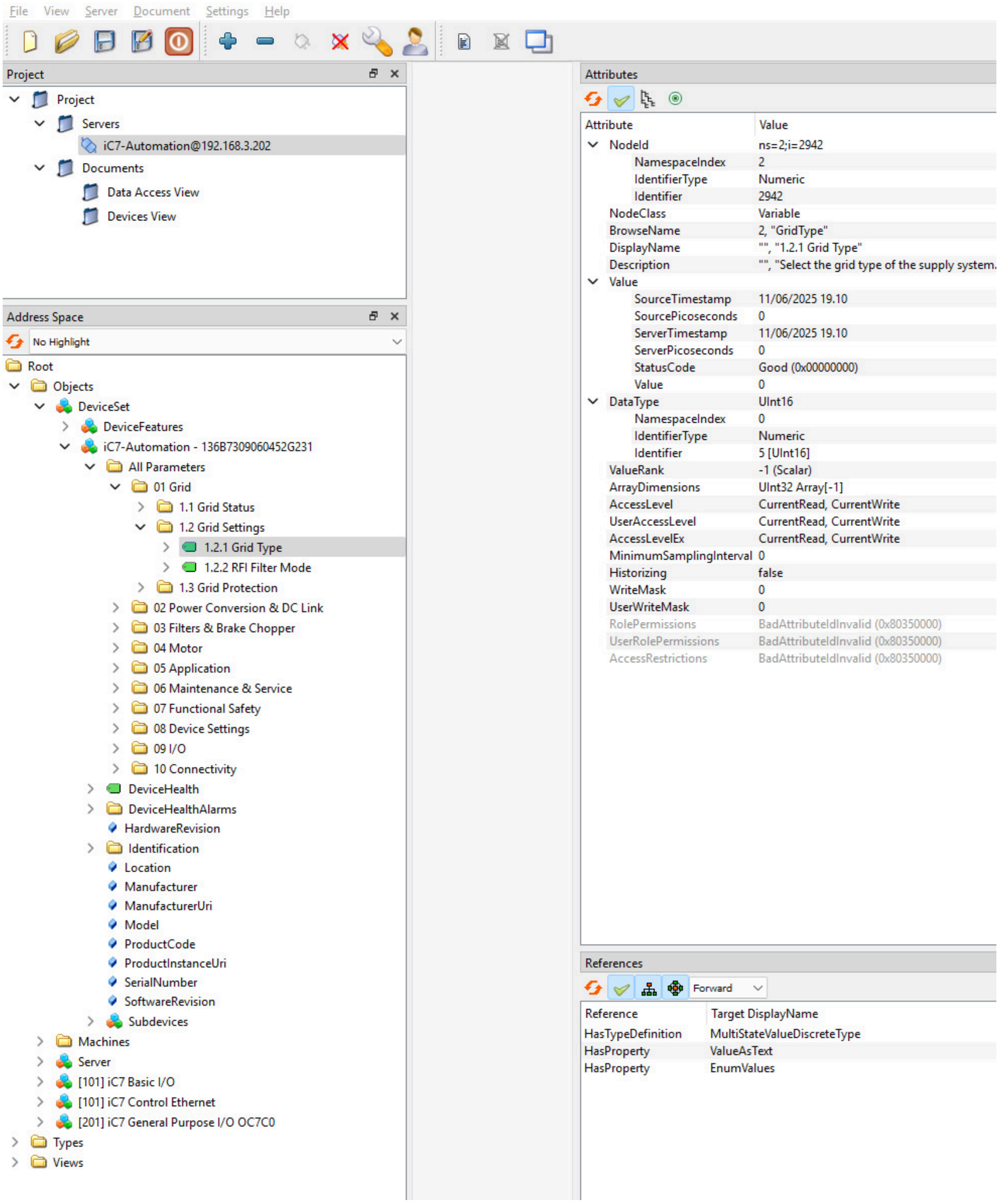


Current Server: iC7-Automation@192.168.3.202

DisplayName	Value	Description
1.1.01 Grid Frequency	49.9974	Shows the actual grid frequency.
1.1.02 Line-To-Line Voltage (RMS)	396.857	Shows the average line-to-line voltage (RMS).
1.1.03 L1-L2 Line Voltage (RMS)	396.526	Shows the L1-L2 line voltage (RMS).
1.1.04 L2-L3 Line Voltage (RMS)	397.192	Shows the L2-L3 line voltage (RMS).
1.1.05 L3-L1 Line Voltage (RMS)	396.852	Shows the L3-L1 line voltage (RMS).
1.1.06 Grid Voltage Imbalance	0.0845787	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
1.1.07 Total Harmonic Distortion (THDv)	1.10709	Shows the total harmonic distortion of the grid voltage (THDv) in %.
1.1.12 Grid Active Power	0	Shows the active power at the point of grid connection.

Figure 33: Parameter View in UaExpert

4. To view parameter information, click the parameter name.



- Project
  - Servers
    - iC7-Automation@192.168.3.202
  - Documents
    - Data Access View
    - Devices View

- Root
  - Objects
    - DeviceSet
      - DeviceFeatures
      - iC7-Automation - 136B7309060452G231
        - All Parameters
          - 01 Grid
            - 1.1 Grid Status
            - 1.2 Grid Settings
              - 1.2.1 Grid Type
              - 1.2.2 RFI Filter Mode
            - 1.3 Grid Protection
          - 02 Power Conversion & DC Link
          - 03 Filters & Brake Chopper
          - 04 Motor
          - 05 Application
          - 06 Maintenance & Service
          - 07 Functional Safety
          - 08 Device Settings
          - 09 I/O
          - 10 Connectivity
        - DeviceHealth
        - DeviceHealthAlarms
        - HardwareRevision
        - Identification
        - Location
        - Manufacturer
        - ManufacturerUri
        - Model
        - ProductCode
        - ProductInstanceUri
        - SerialNumber
        - SoftwareRevision
        - Subdevices
    - Machines
    - Server
    - [101] iC7 Basic I/O
    - [101] iC7 Control Ethernet
    - [201] iC7 General Purpose I/O OC7C0
  - Types
  - Views

Attribute	Value
NodeId	ns=2;i=2942
NamespaceIndex	2
IdentifierType	Numeric
Identifier	2942
NodeClass	Variable
BrowseName	2, "GridType"
DisplayName	"", "1.2.1 Grid Type"
Description	"", "Select the grid type of the supply system.
Value	
SourceTimestamp	11/06/2025 19.10
SourcePicoseconds	0
ServerTimestamp	11/06/2025 19.10
ServerPicoseconds	0
StatusCode	Good (0x00000000)
Value	0
DataType	UInt16
NamespaceIndex	0
IdentifierType	Numeric
Identifier	5 [UInt16]
ValueRank	-1 (Scalar)
ArrayDimensions	UInt32 Array[-1]
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite
AccessLevelEx	CurrentRead, CurrentWrite
MinimumSamplingInterval	0
Historizing	false
WriteMask	0
UserWriteMask	0
RolePermissions	BadAttributeIdInvalid (0x80350000)
UserRolePermissions	BadAttributeIdInvalid (0x80350000)
AccessRestrictions	BadAttributeIdInvalid (0x80350000)

Reference	Target DisplayName
HasTypeDefinition	MultiStateValueDiscreteType
HasProperty	ValueAsText
HasProperty	EnumValues

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Figure 34: Using the Parameter View in UaExpert

3.8 Browse using NodeId, BrowseName, or DisplayName

In OPC UA, there are multiple ways to address a node, known as browsing. Browsing is supported through the following mechanisms:

- Browse by NodeId: The NodeId is identical to the Parameter Number given to the Parameters of the device. Parameter numbers do not change, but their location in the menus may vary based on software version. It is recommended to use the NodeId for permanent clients reading specific device data.
- Browse by BrowseName: BrowseName is a constructed name of the parameter when it was added to OPC UA and remains the same even if DisplayName is updated. The name is constructed so that it conforms to the limitations given by OPC UA BrowseName, for

example, no spaces or special characters are allowed. If clients need to show the menu structure as given by the device, and reading or writing data is required, it is recommended to browse using BrowseName and show using DisplayName

- Browse by DisplayName: The DisplayName is linked to the menu index and the current name of the index. The naming of menus can change.

Each mechanism has distinct advantages. When developing a client to access device data, consider compatibility with future product versions.

> **IMPORTANT:** Avoid hardcoding namespace IDs.
>
> Namespaces IDs are semi-dynamic within the device due to the support of 0 to many options of the same or different type. When options are added or removed, the namespace IDs change. It is recommended to always look up the namespace IDs. The product provides unique names for each namespace. It is recommended to list the Namespaces currently available and to look up the Namespace ID to be used based on the name.

3.9 Alarms and Conditions

The status of the devices can be monitored using the alarms and conditions feature in OPC UA. The general health status of a device can be read using the DeviceHealth interface. All alarms defined by the device, including options, are located in the folder DeviceHealthAlarms. It is also possible to subscribe to events.

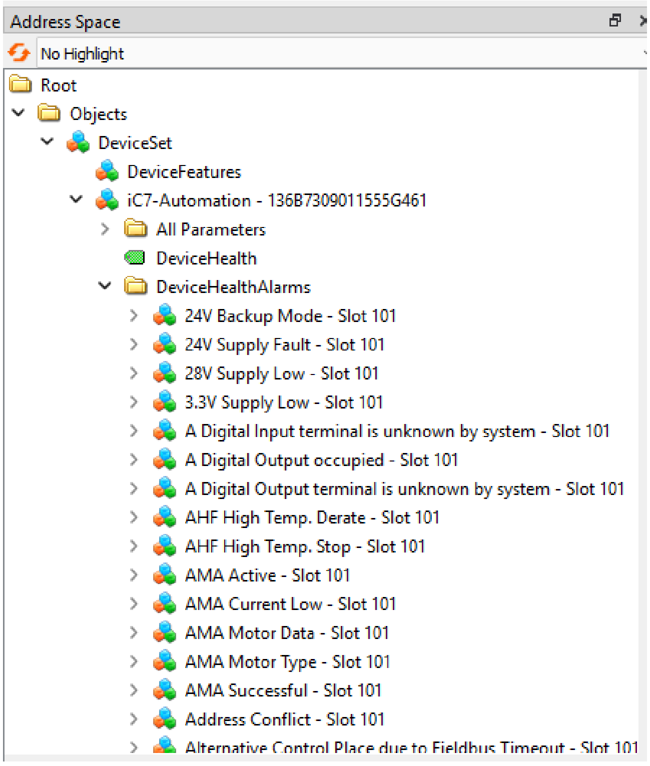

Address Space
No Highlight
Root
Objects
DeviceSet
DeviceFeatures
iC7-Automation - 136B7309011555G461
All Parameters
DeviceHealth
DeviceHealthAlarms
24V Backup Mode - Slot 101
24V Supply Fault - Slot 101
28V Supply Low - Slot 101
3.3V Supply Low - Slot 101
A Digital Input terminal is unknown by system - Slot 101
A Digital Output occupied - Slot 101
A Digital Output terminal is unknown by system - Slot 101
AHF High Temp. Derate - Slot 101
AHF High Temp. Stop - Slot 101
AMA Active - Slot 101
AMA Current Low - Slot 101
AMA Motor Data - Slot 101
AMA Motor Type - Slot 101
AMA Successful - Slot 101
Address Conflict - Slot 101
Alternative Control Place due to Fieldbus Timeout - Slot 101
e30bm644.10

Figure 35: Example of DeviceHealthAlarms

Table 13: Device Health Statuses

Name	Value	Description
NORMAL	0	No fault or warning occurrences active
FAILURE	1	Fault active

Table 13: Device Health Statuses - (continued)

Name	Value	Description
CHECK_FUNCTION	2	Not implemented
OFF_SPEC	3	Not implemented
MAINTENANCE_REQUIRED	4	Warning active (and no faults)

Alarms have a severity and attributes. The higher the number, the more severe the alarm is. The attribute ActiveState can be used to monitor if the alarm is active or not.

Table 14: Alarm Severity

Level	Type	Severity	Urgency
Info	Any	50	LOW
Warning	Any	450	MEDIUM
Warning	Requires a reset	500	MEDIUM
Fault	Requires a reset	800	HIGH
Fault	Protected	1000	HIGH

When alarms are reset on the drive, they are no longer active on OPC UA. The condition name contains the event number from the event log in MyDrive® Insight and the option slot number where the event originates from.

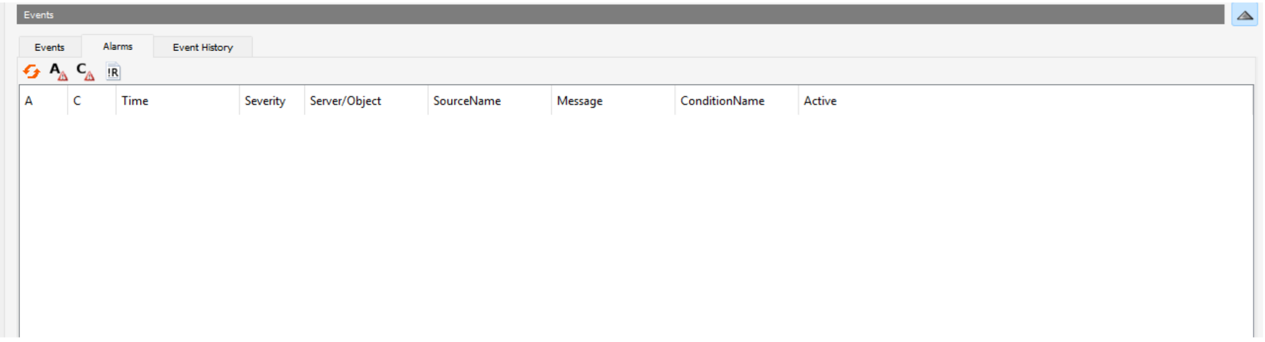
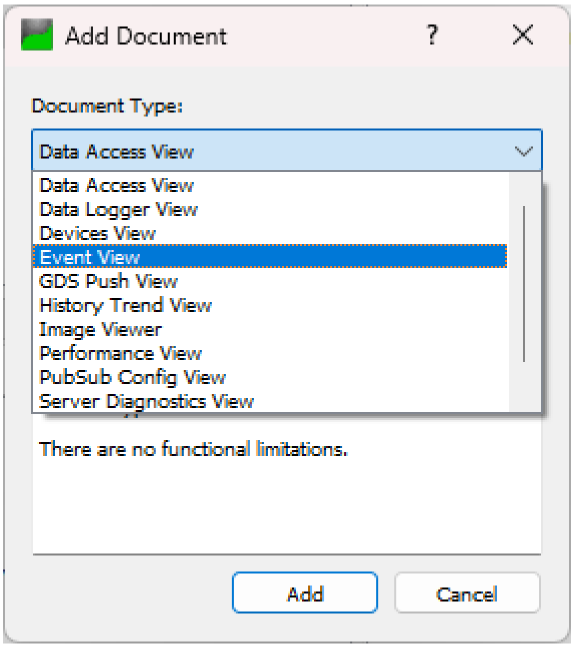


Figure 36: Example of Alarms in UaExpert

3.10 Subscribing to Events

1. Add the event view to *Documents* in UaExpert.



Add Document

Document Type:

Data Access View

Data Access View
Data Logger View
Devices View
Event View
GDS Push View
History Trend View
Image Viewer
Performance View
PubSub Config View
Server Diagnostics View

There are no functional limitations.

Figure 37: Adding the Event View

2. Drag the server into the *Configuration*view.

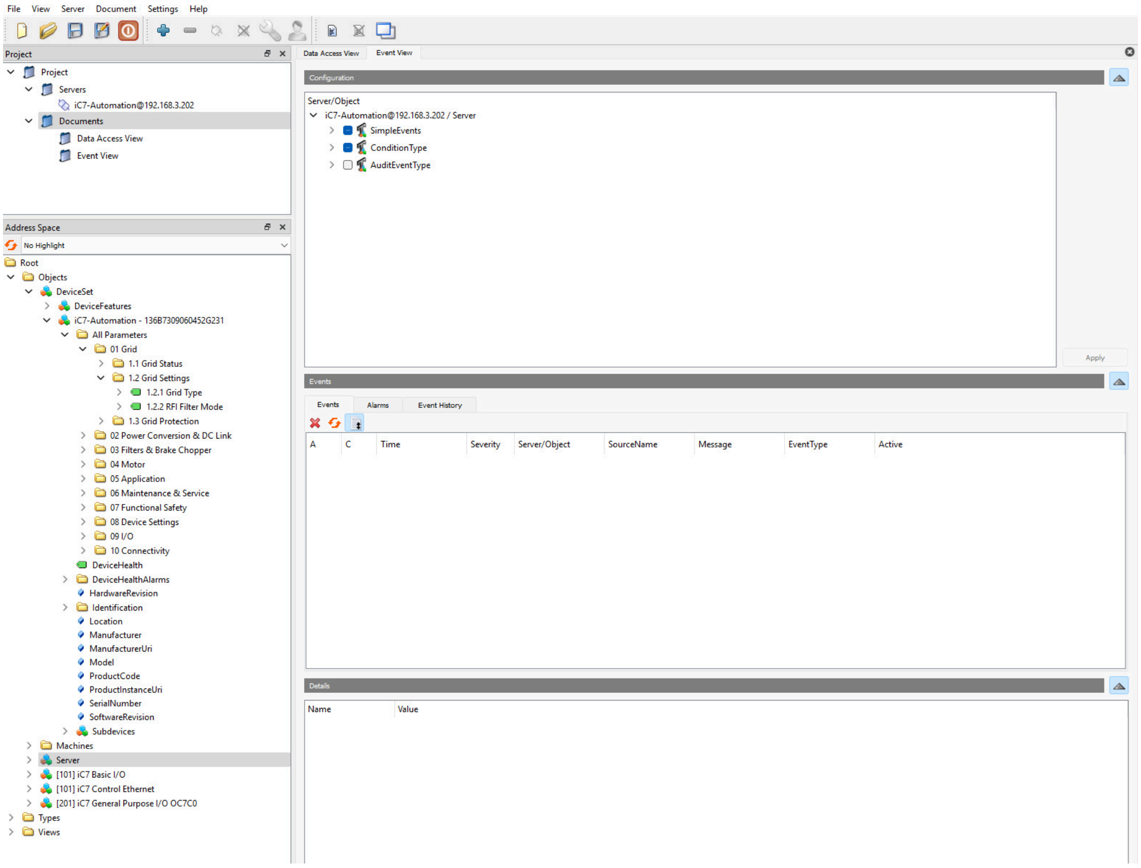
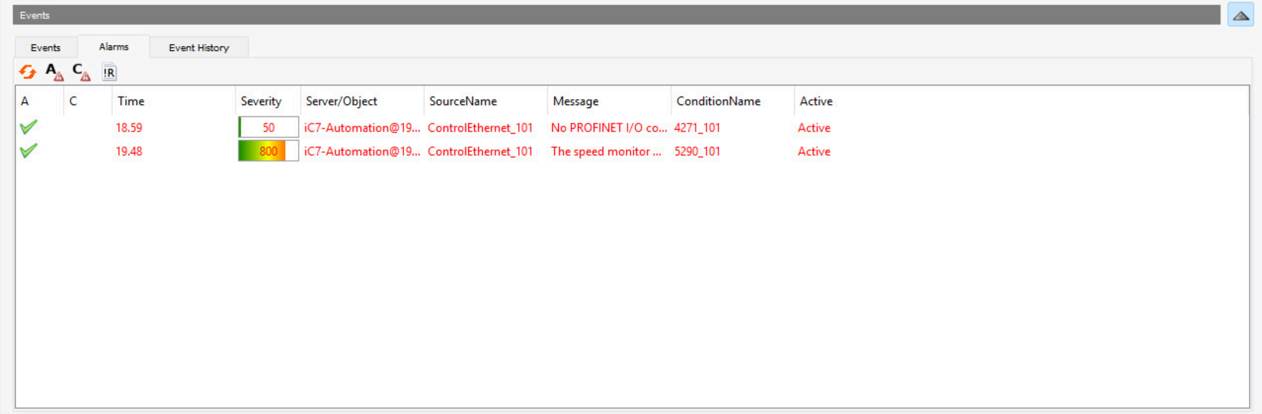


Figure 38: Adding the Server

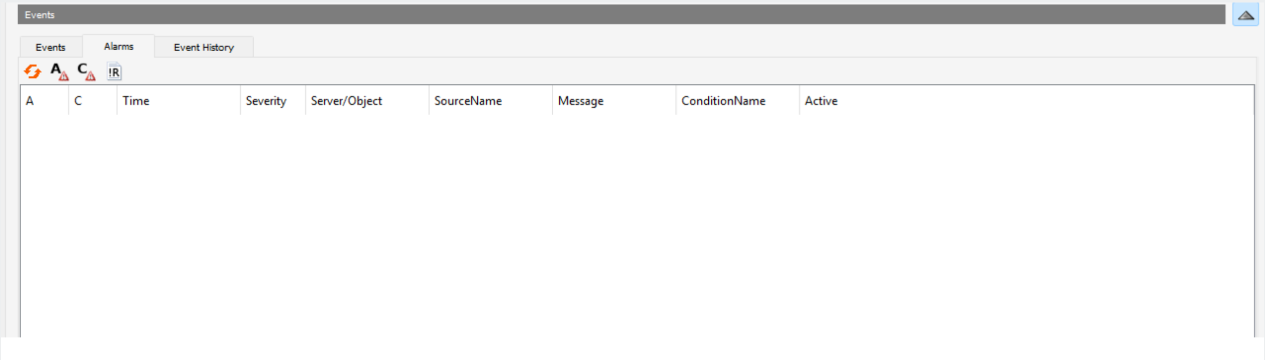
When alarms are triggered in the server, information about the alarm is shown in the *Alarms* tab. The condition name contains the event number from the event log in MyDrive® Insight and the option slot number where the event originates from.



A	C	Time	Severity	Server/Object	SourceName	Message	ConditionName	Active
✓		18.59	50	iC7-Automation@19...	ControlEthernet_101	No PROFINET I/O co...	4271_101	Active
✓		19.48	800	iC7-Automation@19...	ControlEthernet_101	The speed monitor ...	5290_101	Active

Figure 39: Viewing Alarms in UaExpert

When alarms are reset on the drive, they are no longer active on OPC UA.



A	C	Time	Severity	Server/Object	SourceName	Message	ConditionName	Active

Figure 40: Cleared Alarms in UaExpert

4 Troubleshooting

Table 15: Troubleshooting OPC UA

Problem	Solution
Locked out of the device	If a previously created certificate prevents OPC UA communication from being established, use MyDrive® Insight to restore security settings to factory default settings.
	For forgotten account passwords, use an administrative account with the SecurityAdmin role to modify the settings for the account. When no administrative accounts are accessible, use the control panel to restore factory default settings. See the application guide for instructions.
Unable to push certificates to the device	Make sure that OPC UA is running and in provisioning mode on the device. Use the OPC UA status report to see the status of OPC UA of the device.
	Make sure that certificates are pushed to the device using an account that has the SecurityAdmin role.
Unable to log in from OPC UA	Check that the user account exists on the device. Log in to MyDrive® Insight using an account with the SecurityAdmin role to see the full list of user accounts.
	Make sure that the correct password is used for the user account. Check that the same user name and password can be used to log into MyDrive® Insight.
	Some OPC UA clients do not allow using empty passwords. Make sure that a password has been configured for the user account.
Unable to establish secure communication with the device from client	Make sure that the device has received a valid device certificate.
	Verify that the certificate of the device is valid for the device. For example, if the IP address or name of the device is changed, a new certificate needs to be created for the device.
	Make sure that the system clock is set to the correct time.
	Make sure that the certificate of the device has not expired.
	Check whether the certificate has been revoked.
	Check that the certificate is trusted by the client.
	Make sure that the client has access to the full certificate chain to validate the signature of the device certificate.
The client is unable to connect to the drive.	Make sure that the device supports OPC UA. Drives that support OPC UA have the OPC UA parameters shown in parameter group *10.3.6 OPC UA*. If no manifest is available, the drive or application does not support OPC UA.
	Check that the device can be reached through ping. If no reply is received: • Check the IP address configured for the device and client. • Check the cables and link.
	Check that OPC UA is enabled for the interface connected to the client. For information on changing the active OPC UA interface, see 3.3.1 Configuring OPC UA.
The client is unable to modify the data of nodes	Only authorized users are allowed to modify the data of the device. Make sure that the user account used to log in is an authorized user.
	Not all data is modifiable through OPC UA. Make sure that the data is writable.
	Some clients require an additional apply to write the data configured. Make sure that the client sends the write request as expected.

Table 15: Troubleshooting OPC UA - (continued)

Problem	Solution
X1/X2 interface is not available in the selection list for the parameter	The X1/X2 interface is not available on the drive. Use X0 instead.
	The fieldbus configured for the X1/X2 interface does not support IP traffic. Use the X0 interface for OPC UA communication.

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