Devices Module How-to

Connect and organize field devices and protocols.

Overview

Devices Module (How-to Guide) walks you through configuring the Devices module to establish real-time communication with field devices using native protocols.In this guide we will:

- Create channels
- Configure nodes
- Map points
- Set up data exchange with PLCs and other industrial equipment

Prerequisites:

- Tags created in UNS
- Network access to devices
- Device documentation (addresses, data types)

Configuration Workflow
Step 1: Create Communication Channel
Step 2: Add Device Nodes
Step 3: Map Device Points
Step 4: Configure AccessTypes
Step 5: Test Communication
Importing PLC Addresses
Diagnostics Tools
Common Issues
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Configuration Workflow

1. **Create Channel** - Select protocol and connection settings
2. **Create Nodes** - Add devices to channels
3. **Map Points** - Link tags to device addresses
4. **Configure AccessTypes** - Define read/write behavior
5. **Test Communication** - Verify data exchange

Step 1: Create Communication Channel

A channel defines the protocol and connection parameters.

Creating a Channel

1. Navigate to **Devices Channels**
2. Click **New Channel** or **Plus** icon
3. In the dialog:
    - Select **Protocol** (e.g., Modbus, ControlLogix)
    - Enter **Channel Name**
    - Configure **Interface**:
        - Serial (RS232/485)
        - TCPIP (Ethernet)
    - Click **OK**

Configure Channel Settings

Double-click properties to edit:

Property	Description	Example
Interface	Connection type	TCPIP
Settings	Protocol-specific parameters	IP: 192.168.1.100, Port: 502
Timeout	Response timeout	3000ms
InitialState	Startup behavior	Enabled

Step 2: Add Device Nodes

Nodes represent physical devices on the network.

Creating a Node

1. Go to **Devices Nodes**
2. Click **Plus** icon
3. Configure:
    - **Name**: Device identifier
    - **Channel**: Select from list
    - **PrimaryStation**: Device address
4. Click **OK**

Node Address Examples

Protocol	PrimaryStation Format
Modbus TCP	192.168.1.100:502:1
OPC UA	opc.tcp://server:4840
ControlLogix	192.168.1.50:Slot=0

Step 3: Map Device Points

Method A: Manual Mapping

1. Go to **Unified Namespace Tags**
2. Copy tags to map
3. Navigate to **Devices Points**
4. Paste tags
5. Configure for each point:
    - **Node**: Select device
    - **Address**: Device register/topic
    - **DataType**: Match device type
    - **AccessType**: Read/write behavior

Method B: Using DataExplorer

1. Go to **DataExplorer MQTT Tools** (or OPC/PLC tools)
2. Connect to data source
3. Browse available data
4. Select items and click **Map to Solution**
5. System creates tags and mappings automatically

Address Format Examples

Protocol	Address Format	Example
Modbus	Operand + Address	40001 (Holding Register 1)
MQTT	Topic path	spBv1.0/Group/Node/Device
OPC UA	Node path	ns=2;s=Channel1.Device1.Tag1

Step 4: Configure AccessTypes

AccessTypes define read/write behavior for points.

Create or Edit AccessType

1. Navigate to **Devices AccessTypes**
2. Click **Plus** icon or edit existing
3. Configure:

Read Settings:

- **ReadPolling**: Enable/Disable/OnDisplayOrServer
- **ReadPollingRate**: Update frequency (ms)
- **OnStartup**: Read on solution start

Write Settings:

- **WriteEvents**: Enable writing
- **WriteEvent**: OnChange/Periodic

Special AccessType: OnDisplayOrServer

Use for optimization - only reads when:

- Tag is displayed on an open screen
- Solution is serving as OPC/MQTT server

Step 5: Test Communication

Using Built-in Simulators

MQTT Testing

1. **Start MQTT Broker:**
   - Go to **DataExplorer MQTT Tools**
   - Click **Start** for Built-in Broker
   - Click **Start** for Publisher Simulator
2. **Test Connection:**
   - In **Devices Nodes**
   - Select MQTT node
   - Click **Test** in PrimaryStation field

Modbus Testing

1. **Start Modbus Simulator:**
   - In **Devices Channels** or **Nodes**
   - Select Modbus channel/node
   - Click **Modbus Simulator** button
2. **Configure Test:**
   - Set PrimaryStation to 127.0.0.1 (localhost)
   - Click **Test** button

Runtime Testing

1. Press **F5** or click **Run Test**
2. Open **Property Watch**
3. Monitor tag values:
   - Check Quality (192 = Good)
   - Verify values update
   - Test writes if configured

Importing PLC Addresses

Users can simplify the creation of communication nodes and point addresses through various methods for automatic data configuration import. This includes copying and pasting tables from Excel, importing data from CSV files, and using Import Wizards for diverse data sources.

Importing Methods

When creating communication nodes and point addresses, there is no need to retype addresses if they are already defined in another data source. The platform supports several methods to import remote data configuration automatically:

- **Copy and Paste from Excel**: You can copy and paste the contents of a table from Excel. The tables can have different columns or orders if you include the column titles in the copy-and-paste operations. The system will place the data in the expected columns, even if the order differs between the source and target tables.
- **Import from CSV Files**: You can import data from CSV files.
- **Import from L5k Definition Files**: For Rockwell ControlLogix devices, you can import from L5k definition files.
- **Import Wizards**: Use various Import Wizards for many data sources.
- **Programming API**: A programming API can populate the tables from code, even during runtime execution when necessary.

If your PLC or field device has an open file database with available addresses, and you want a tightly integrated configuration, contact us. We have programming interfaces to allow that, similar to what we did with OPC data sources.

Importing from an OPC server

Importing data from an OPC server allows efficient and streamlined integration with industrial automation systems. By creating an OPC communication node and selecting the "Import" option, the platform automatically creates tags and communication points based on the information available from the OPC server. This functionality simplifies the configuration and maintenance of the project, optimizing the data integration process. To learn more about importing data from an OPC server, please visit Importing Tags from OPC Servers.

Importing from Excel

The import and export of tags and PLC addresses are streamlined due to its integration with Excel, as the software extensively utilizes tables in various features. You can copy and paste the data directly into the platform by creating a table in Excel with the required columns, such as TagName, Type, and Address. The software ensures the accurate data assignment to the corresponding columns, even if the column order differs. After the first import, the system stores your settings, making synchronizing previously imported and new addresses easy. For more detailed information on tags' import and export process, visit Importing Tags from CSV files.

Diagnostics Tools

Property Watch

- Monitor tag values and quality
- Test read/write operations
- View communication status

Trace Window

- View raw protocol messages
- Monitor communication frames
- Identify addressing errors

Module Information

- Check channel status
- View node connections
- Monitor error counts

Common Issues

No Communication

- Verify network connectivity
- Check firewall settings
- Confirm device address/port
- Test with simulator first

Bad Quality (0)

- Wrong address configuration
- Device not responding
- Protocol mismatch
- Security/credentials issue

Values Not Updating

- Check AccessType settings
- Verify polling rate
- Confirm point mapping
- Check device status

Write Not Working

- Enable WriteEvents in AccessType
- Check device write permissions
- Verify address is writable

Best Practices Checklist

- **Test with simulators first** - Verify configuration before connecting to real devices
- **Use appropriate AccessTypes** - OnDisplayOrServer for non-critical data
- **Group similar points** - Optimize communication blocks
- **Monitor communication health** - Check quality and error counts
- **Document addressing** - Keep record of device mappings
- **Start with slow polling** - Increase rate after confirming stability

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Protocol-Specific Resources

- **[Modbus Configuration]** - Operands and addressing
- **[MQTT SparkplugB]** - Topic structure and templates
- **[OPC UA]** - Security and browsing
- **[ControlLogix]** - Tag import from L5K

Devices Module Links

Explanation - about foundational technologies

Platform Overview / Technology /Native Drivers, OPC and MQTT

Explanation - to understand concepts

Modules / Industrial Operations / Devices Module

Tutorials - to learn by doing

Tutorials / Industrial Operations / Devices Module Tutorial

How-to Guides - to accomplish specific tasks

How-to Guides / Industrial Operations / Devices Module How-to Guide

Reference - technical details

Technical Reference /Industrial Operations / Devices Module Reference

This guide provides the framework for device communication. Adapt the procedures to your specific protocol while following the same systematic approach.

In this section...
