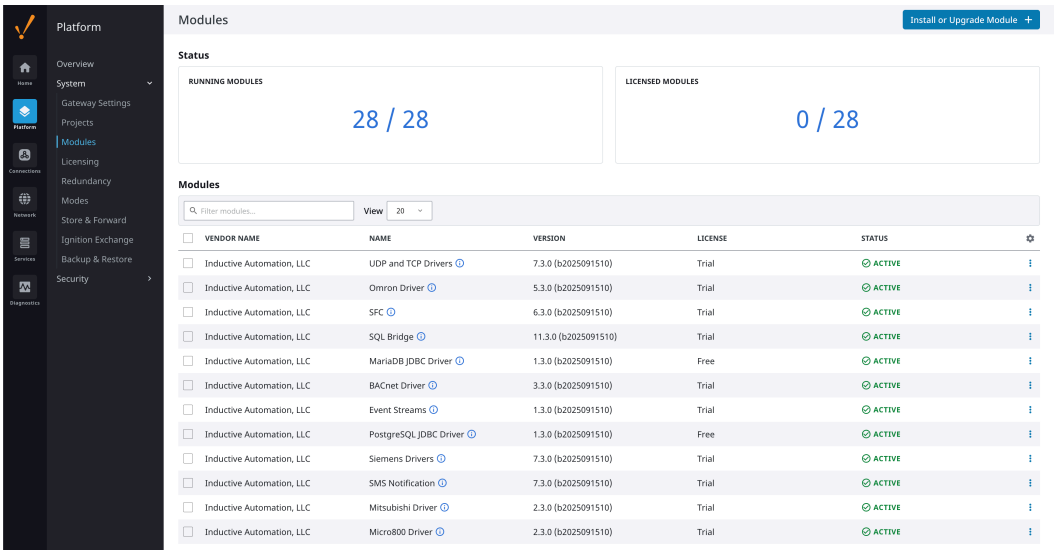
ToddySoft Connect ADS Driver - Ignition 8.3

Ignition 8.3 module for connecting to Beckhoff TwinCAT PLCs via the ADS/AMS protocol, with support for plain TCP and encrypted "Secure ADS" (TLS) connections.

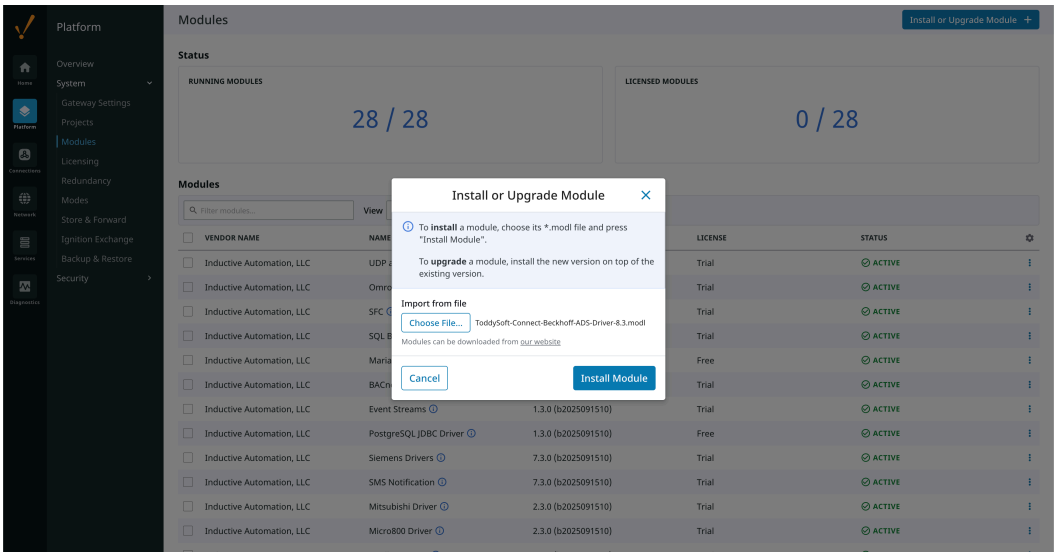
The device configuration uses a custom configuration form that adapts to the selected **Transport**: only the settings relevant to the chosen transport are shown, so you are never presented with fields that do not apply.

Installation

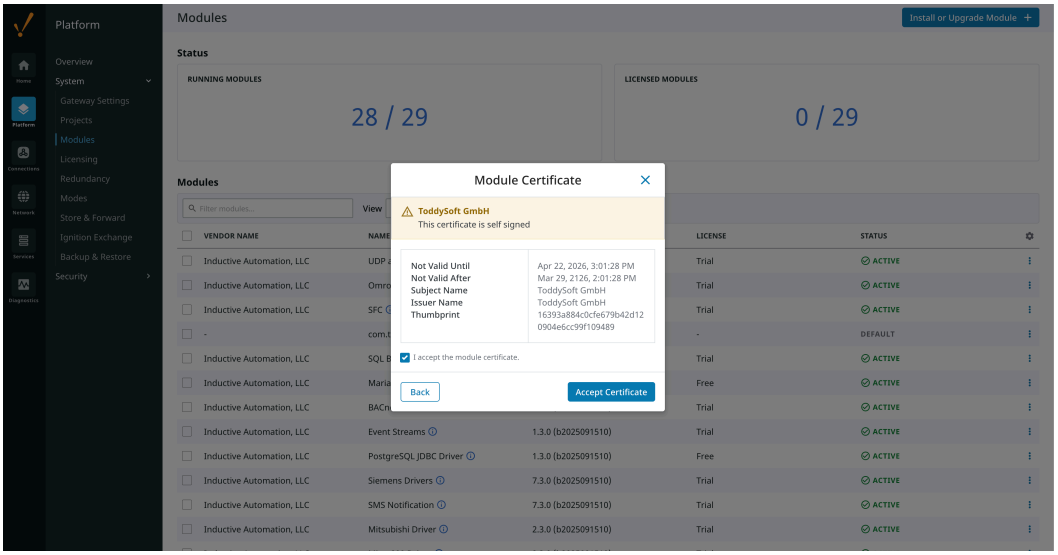
1. Open the Ignition Gateway web interface and navigate to **Config > System > Modules**.



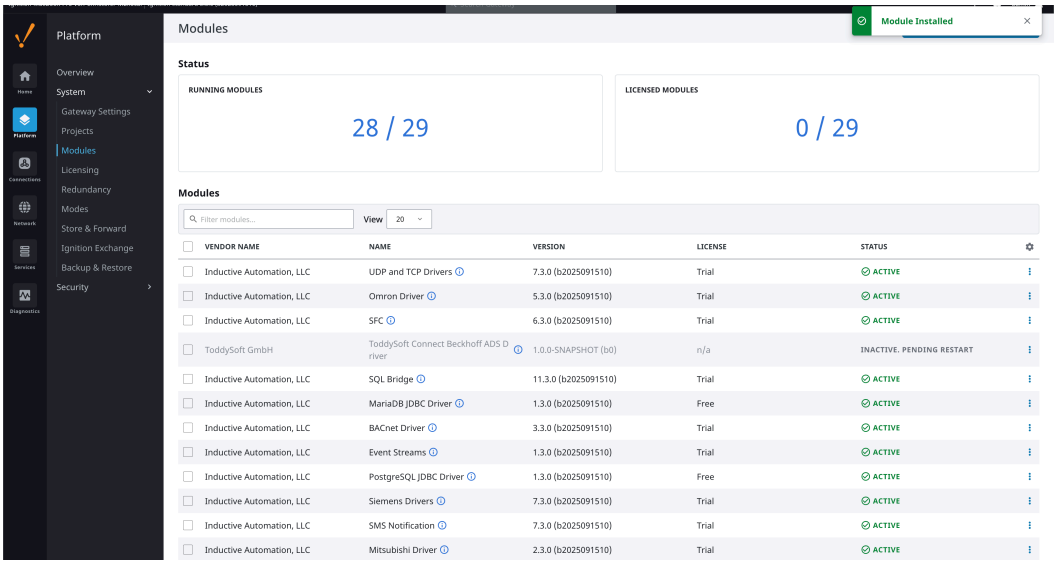
2. Click **Install or Upgrade a Module...**.



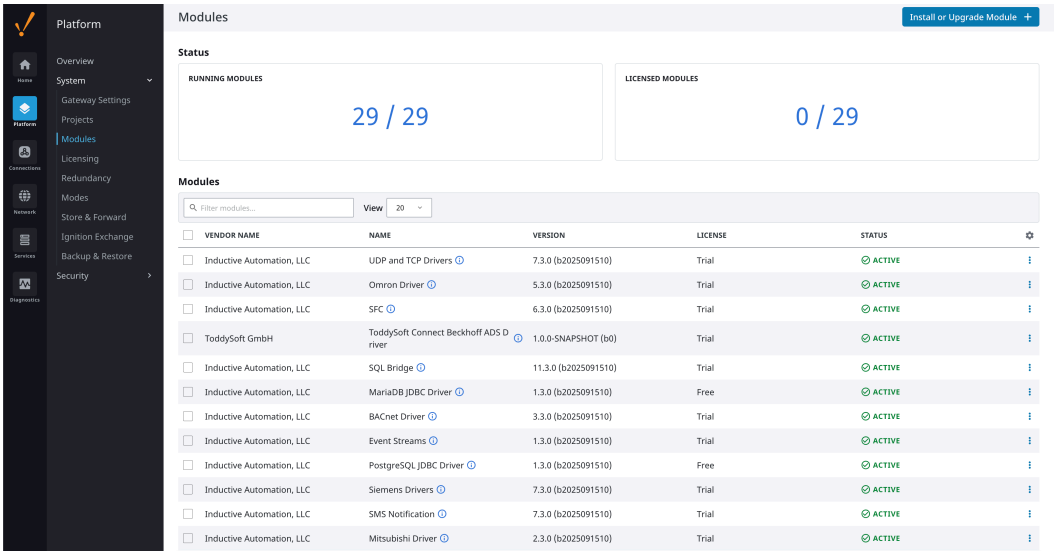
3. Select the `ToddySoft-Connect-Beckhoff-ADS-Driver-8.3.modl` file and upload it.



4. Accept the license / certificate prompt to continue the installation.

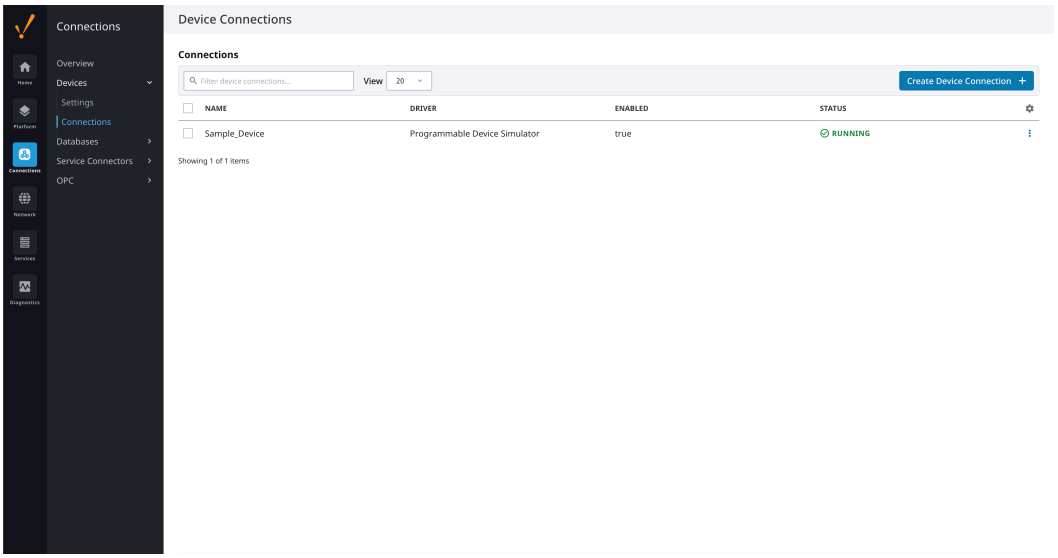


5. Wait for the Gateway to finish and verify the module appears as **Running** in the modules list.

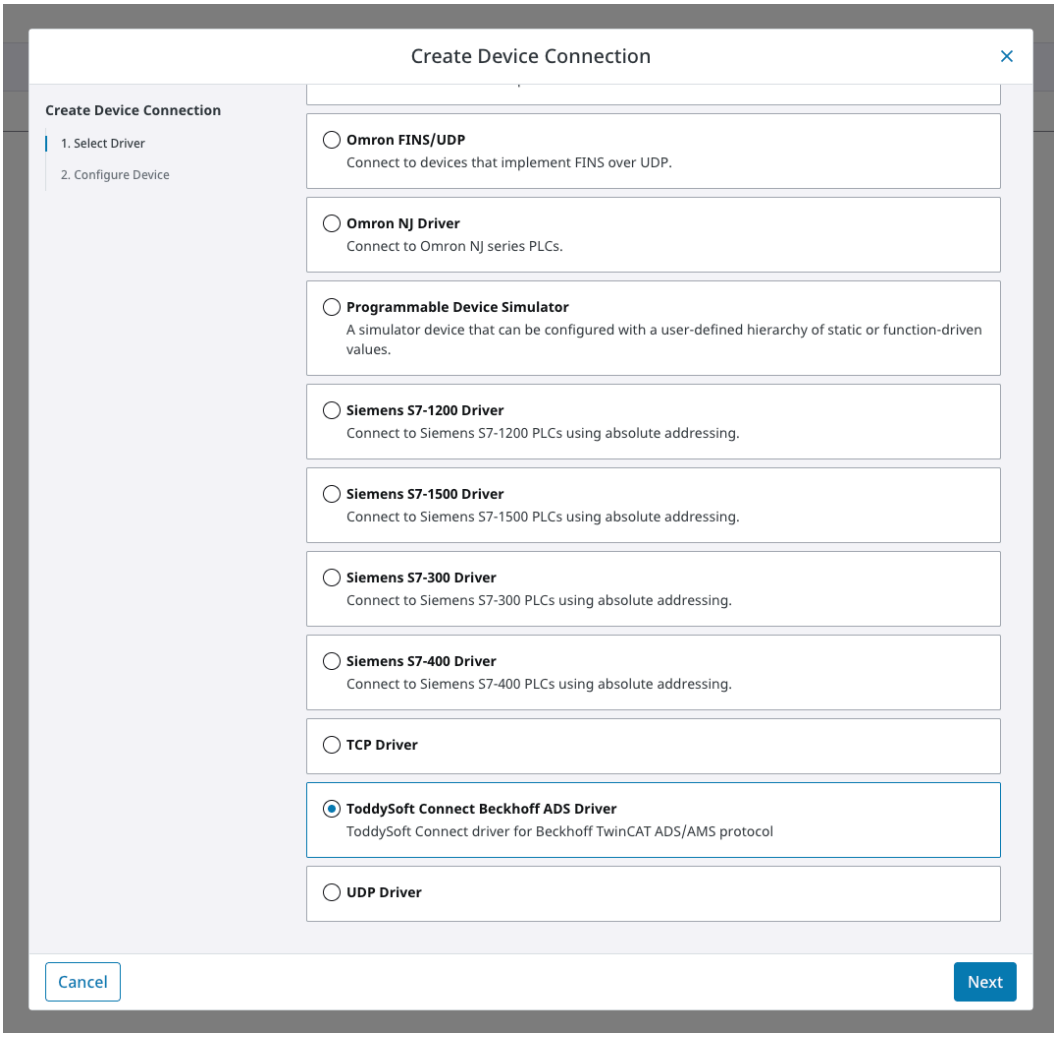


Creating a Device Connection

1. Go to **Config > OPC UA > Device Connections**.

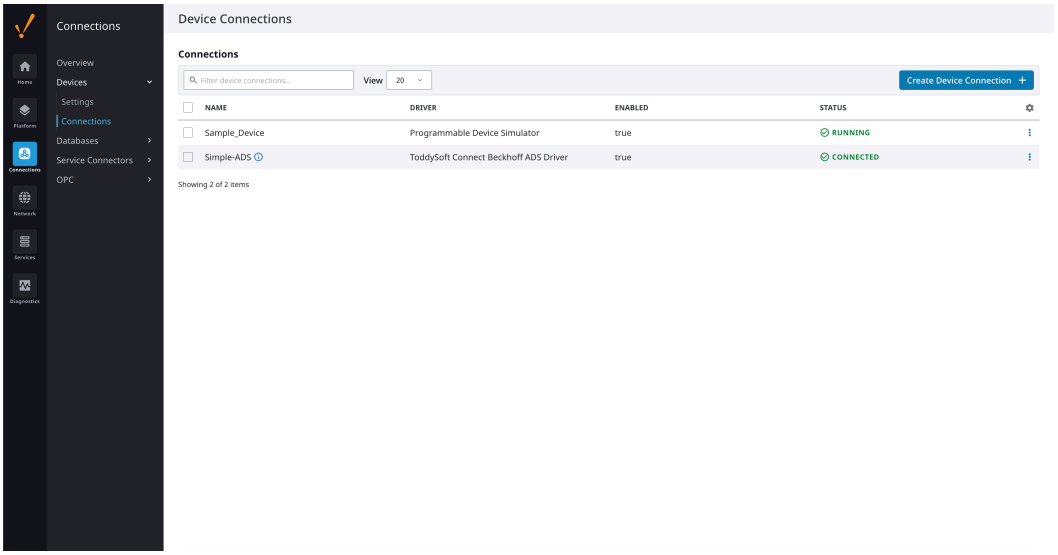


2. Click **Create new Device...** and select **ToddySoft Connect ADS Driver** as the device type.



3. Configure the connection settings (see the sections below) and click **Create Device Connection**.

4. The new device then appears in the Device Connections list.

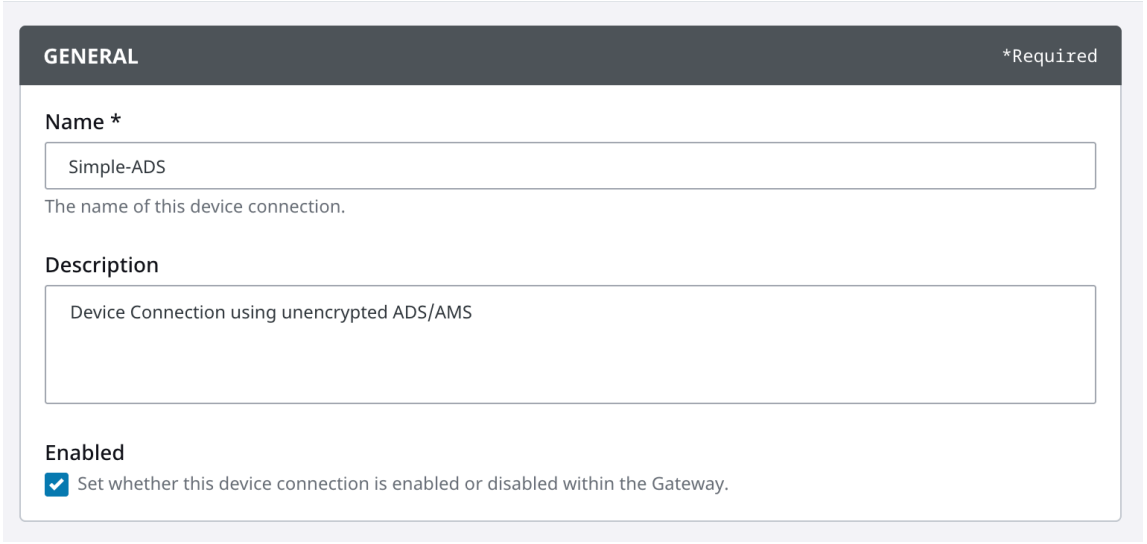


Configuration

The configuration form is organized into the following sections, top to bottom: **General**, **Transport**, **Transport Settings**, **ADS / AMS Settings**, **Advanced Transport Settings** and **Audit Log**.

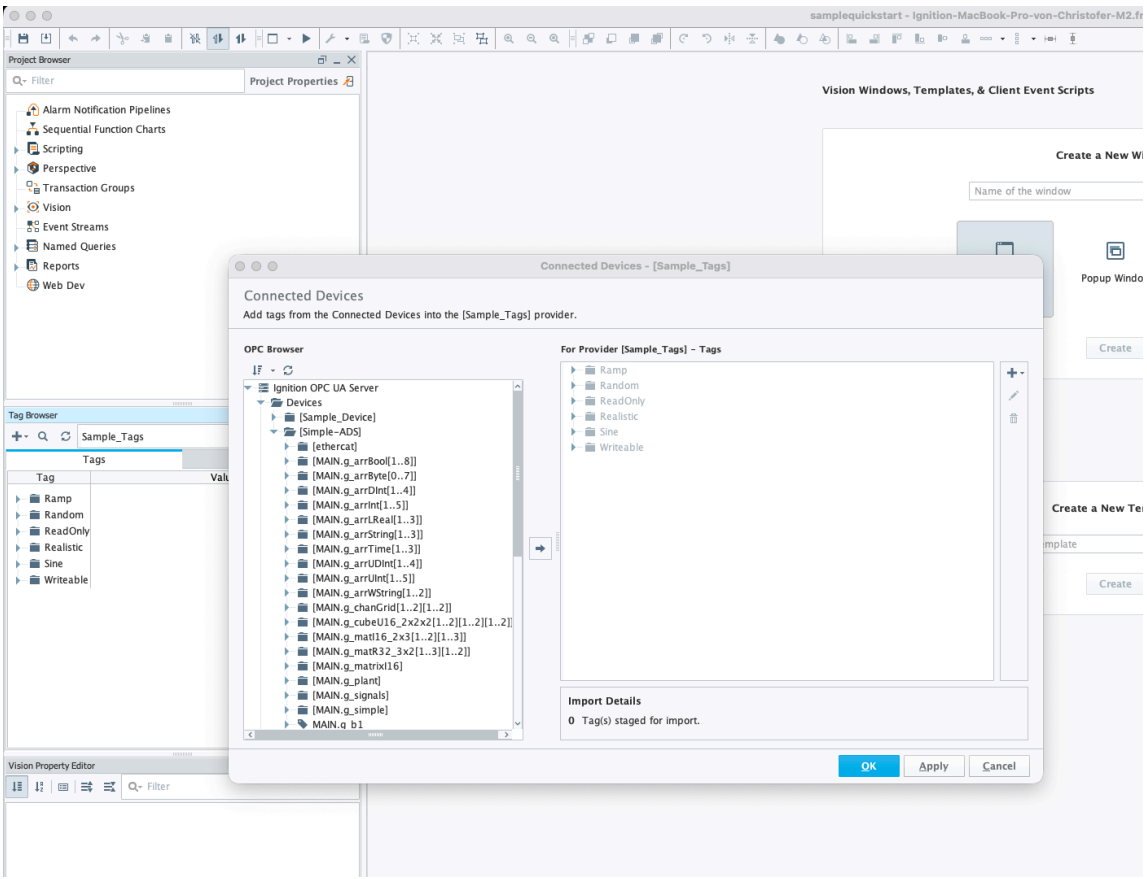
General

Assigns a name (and optional description) to the connection and controls whether it is enabled.



Setting	Description	Default
Name	Unique name for this device connection	
Description	Optional description for this connection	
Enabled	Whether the connection is active	`true`

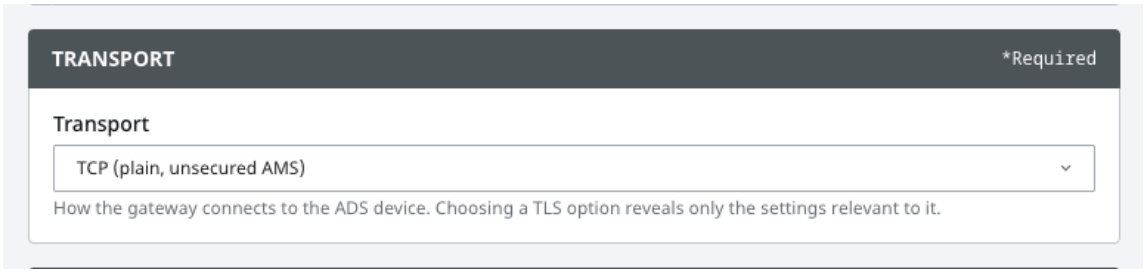
This is the name the connection is then referenced under in other parts of Ignition:



If `Enabled` is not checked, no connection is established until it is enabled.

Transport

Selects how the gateway connects to the ADS device. Choosing one of the TLS options reveals only the settings relevant to it in the **Transport Settings** section below.



Transport	Description
TCP (plain, unsecured AMS)	Plain, unencrypted ADS over TCP (default). No certificates or keys needed.

TLS-PSK	Encrypted ("Secure ADS") using a pre-shared key + identity. No certificates.
TLS-SSC (Self-Signed Certificate)	Encrypted using an automatically generated self-signed certificate.
TLS-SCA (Shared Certificate Authority)	Encrypted using certificates signed by a shared Certificate Authority (CA).

When any TLS transport is selected, the connection port automatically switches from `48898` to `8016`, unless a non-default port has been set explicitly.

> ***Storing passwords and keys:*** *The secret fields used by the TLS transports (* `Keystore Password`*,* `Route Password` *and* `Pre-Shared Key`*) are handled through Ignition 8.3's secret management. For each you can choose* ***None****, store the value* ***Embedded*** *(encrypted within the device configuration) or* ***Referenced*** *from a configured secret provider. Values are never persisted in plain text.*

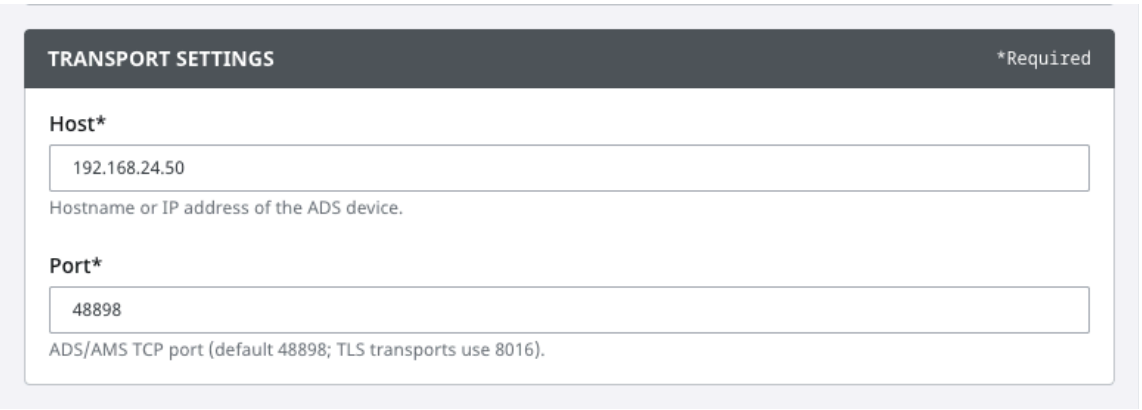
Transport Settings

Always contains **Host** and **Port**; the remaining fields depend on the selected transport.

Setting	Description	Default
Host	Hostname or IP address of the TwinCAT device	`localhost`
Port	TCP port number (default 48898; TLS: 8016)	`48898`

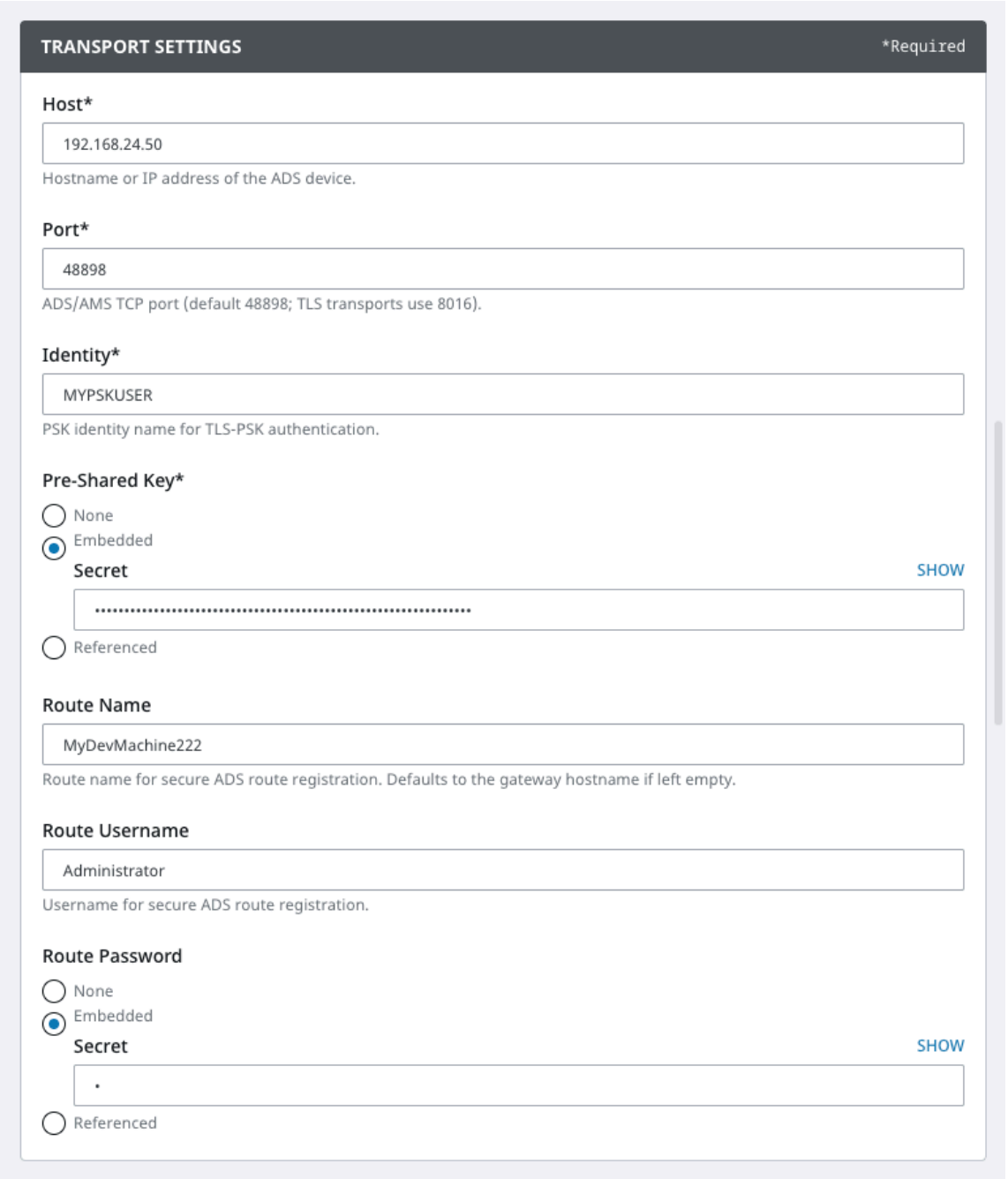
TCP (plain, unsecured AMS)

Plain TCP shows only Host and Port — no security fields.



TLS-PSK

Uses TLS-PSK, where both sides share a secret key and identity string. No certificates are needed — this is the simplest way to encrypt ADS communication.



Setting	Description	Default
Identity	PSK identity string (must match the PLC configuration)	*(empty)*
Pre-Shared Key	Hex-encoded shared secret key (secret field)	*(None)*
Route Name	Name for the secure ADS route on the PLC	*(gateway hostname)*
Route Username	Username for secure ADS route registration	`Administrator`
Route Password	Password for secure ADS route registration (secret)	*(None)*

Configuring the PLC for PSK: the PLC must be configured with matching PSK settings. In the TwinCAT Secure ADS configuration (usually in `/etc/TwinCAT/3.1/Target/StaticRoutes.xml`):

- Set the **Identity** to match the value in Ignition (e.g., `MYPSKUSER`)
- Set the **Password/Key** that will be used to derive the pre-shared key

```
                <Server>
                        <Tls>
                                <Psk>
                                        <Identity>MYPSKUSER</Identity>
                                        <Pwd>MySecret</Pwd>
                                </Psk>
                        </Tls>
                </Server>
        </RemoteConnections>
</TcConfig>
```

TwinCAT derives the PSK key by computing `SHA-256(Identity + Password)`. Note that the Identity must be **all uppercase**. To calculate the hex key needed for the Ignition configuration:

```
echo -n "<Identity><Password>" | shasum -a 256
```

For example, with Identity `MYPSKUSER` and Password `MySecret`:

```
echo -n "MYPSKUSERMySecret" | shasum -a 256
# Result: a50d3154fea7bb54eec6710164e33ced872223f0a0ff05179e93e89e7f76c6f0
```

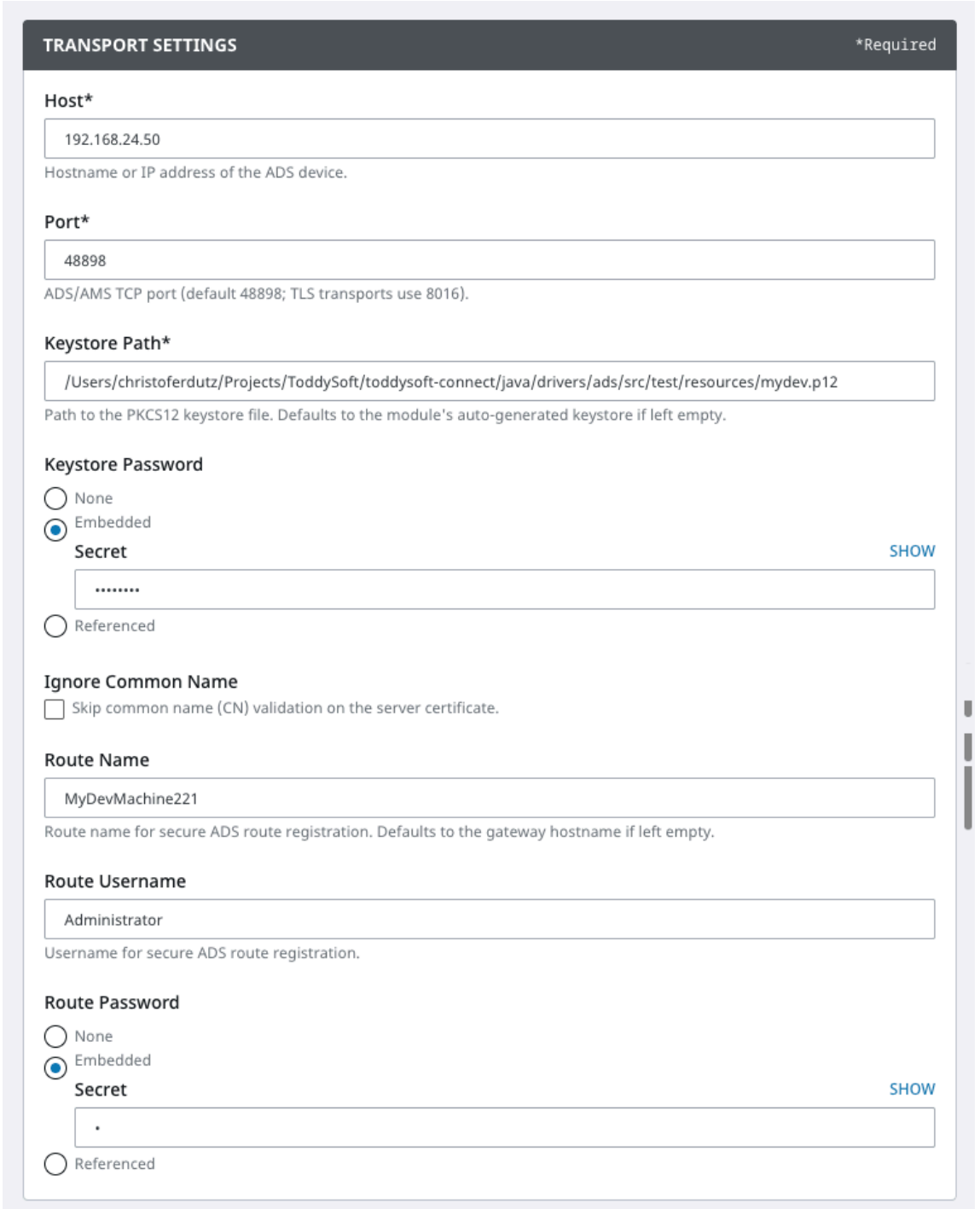
Use the resulting 64-character hex string as the **Pre-Shared Key** value in Ignition (stored Embedded or Referenced).

If the connection was successful, a new route configuration is added to `/etc/TwinCAT/3.1/Target/StaticRoutes.xml`:

```
<Route>
        <Name>MyDevMachine</Name>
        <Address>192.168.24.220</Address>
        <NetId>192.168.24.220.1.1</NetId>
        <Type>TCP_IP</Type>
        <Tls>
                <Psk>
                        <Identity>MYPSKUSER</Identity>
                        <Key>a50d3154fea7bb54eec6710164e33ced872223f0a0ff05179e93e89e7f76c6f0</Key>
                </Psk>
        </Tls>
</Route>
```

TLS-SSC (Self-Signed Certificate) and TLS-SCA (Shared Certificate Authority)

Both certificate-based transports share the same set of fields. **TLS-SSC** uses an automatically generated self-signed certificate (the module manages a PKCS12 keystore and establishes the ADS route on first connection). **TLS-SCA** uses certificates signed by a shared Certificate Authority that both Ignition and the PLC trust — the most secure option for production.



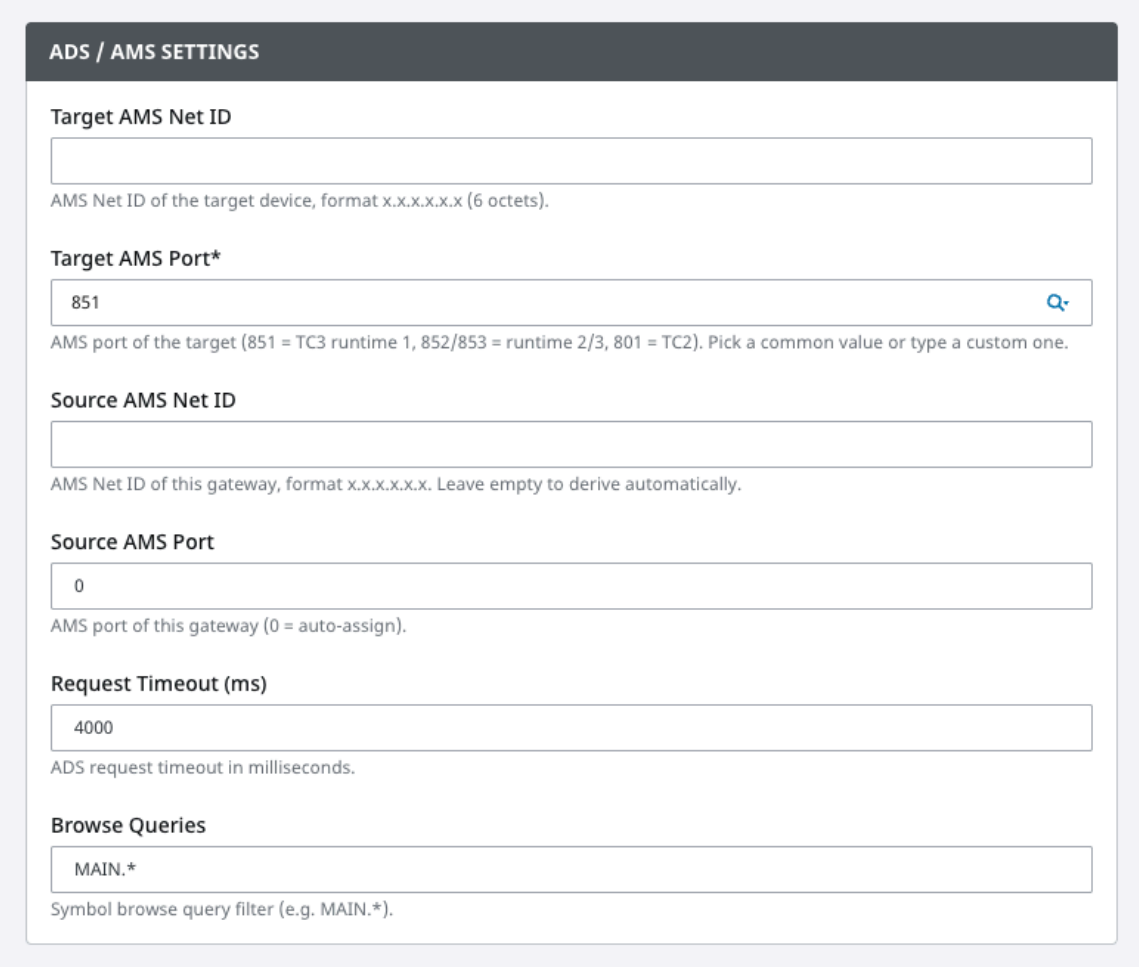
Setting	Description	Default
Keystore Path	Path to the PKCS12 keystore file. For TLS-SSC, leave empty to use the module's auto-generated keystore; for TLS-SCA, point to the CA-signed certificate.	*(auto / required)*
Keystore Password	Password for the keystore (secret field)	*(None)*

Ignore Common Name	Skip common name (CN) validation on the server certificate (use for testing only)	`false`
Route Name	Name for the secure ADS route on the PLC	*(gateway hostname)*
Route Username	Username for secure ADS route registration	`Administrator`
Route Password	Password for secure ADS route registration (secret)	*(None)*

When a keystore path is not specified (TLS-SSC), the module automatically generates a keystore in the Ignition module settings directory. On a successful connection, a new route configuration is added to the PLC's `/etc/TwinCAT/3.1/Target/StaticRoutes.xml`.

ADS / AMS Settings

Configures the ADS-specific addressing. These settings apply regardless of the selected transport.



Setting	Description	Default

Target AMS Net ID	AMS Net ID of the target device (format `x.x.x.x.x.x`). Defaults to `{target-ip}.1.1`	*(auto)*
Target AMS Port	AMS port of the target PLC runtime — pick a common TwinCAT port or type a custom value	`851`
Source AMS Net ID	AMS Net ID of this gateway (format `x.x.x.x.x.x`). Leave empty to derive automatically	*(auto)*
Source AMS Port	AMS port of this gateway (`0` = auto-assign)	`0`
Request Timeout	Default timeout for ADS requests in milliseconds	`4000`
Browse Queries	Symbol browse query filter (e.g. `MAIN.*`)	`MAIN.*`

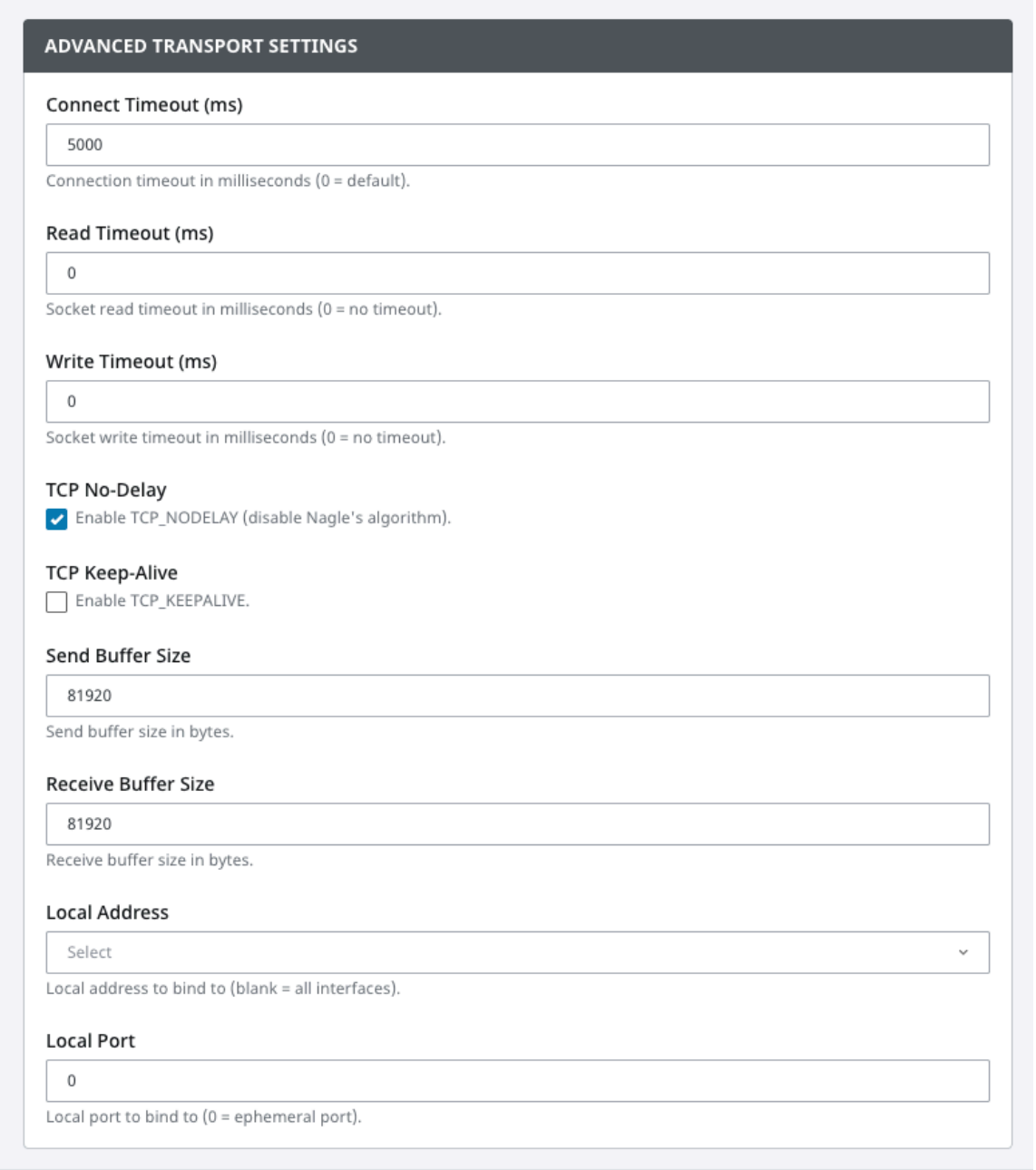
If not provided in the **Target AMS Net ID** field, the value is calculated by appending `.1.1` to the local IP address of the TCP connection. Note that there may be multiple paths to reach the PLC (if the device has multiple IP addresses). To control which local IP address is used, set the **Local Address** in the Advanced Transport Settings section.

The **Target AMS Port** field offers the common TwinCAT runtime ports as suggestions, each with a description, while still allowing any custom value:

Port	Description
851	TwinCAT 3 — PLC runtime 1 (default)
852 / 853	TwinCAT 3 — PLC runtime 2 / 3
801	TwinCAT 2 — PLC runtime 1
811 / 821 / 831	TwinCAT 2 — PLC runtime 2 / 3 / 4

Advanced Transport Settings

Lower-level TCP tuning options. These apply under whichever transport is active.



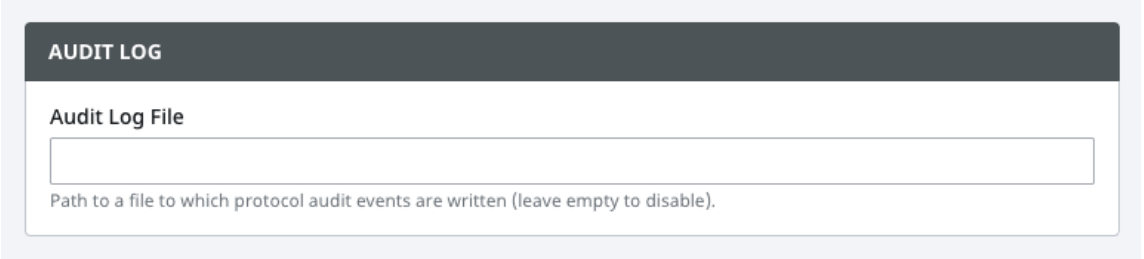
Setting	Description	Default
Connect Timeout	Connection timeout in milliseconds (0 = default)	`5000`
Read Timeout	Socket read timeout in milliseconds (0 = no timeout)	`0`
Write Timeout	Socket write timeout in milliseconds (0 = no timeout)	`0`
TCP No-Delay	Enable TCP_NODELAY (disable Nagle's algorithm)	`true`
TCP Keep-Alive	Enable TCP_KEEPALIVE	`false`

Send Buffer Size	Send buffer size in bytes	`81920`
Receive Buffer Size	Receive buffer size in bytes	`81920`
Local Address	Local address to bind to, chosen from the gateway's network interfaces (blank = all interfaces)	*(all)*
Local Port	Local port to bind to (0 = ephemeral port)	`0`

The **Local Address** field is a dropdown populated with the gateway machine's local IPv4 addresses, which is especially useful when the host has multiple interfaces (see the Docker and VPN notes below).

Audit Log

The `Audit Log` writes important diagnostic information to a dedicated log file. This file can grow quickly, so it is advised to only enable it when investigating issues.



Setting	Description	Default
Audit Log File	Absolute path to the audit log file where events will be recorded. Leave empty to disable.	*(empty)*

NOTE: Please ensure the user the `Ignition` process is running under has write access to this path.

The Audit Log system automatically creates the file and rotates it (creating compressed files next to it) once a certain size is reached or on a time-based schedule.

Tag Addressing

Tags are addressed using symbolic names from the PLC program:

```
MAIN.bStart                  # Boolean
MAIN.iCounter                # Integer
MAIN.fTemperature            # Float
GVL.sStatus                  # String
MAIN.stMotor.fSpeed          # Struct member
MAIN.aValues[0]              # Array element
MAIN.stArray[1].nField       # Struct array element field
```

Configure **Browse Queries** (e.g., `MAIN.*`) to control which symbols appear when browsing tags in the Ignition Designer.

Tag Groups

By default, all tags are collected in the default tag group, which means all selected tags are fetched at the default interval of once a second.

If different intervals are desired, create additional tag groups, configure the desired intervals there, and assign tags to the corresponding tag groups.

Troubleshooting

Device shows "Faulted":

- Verify the PLC hostname/IP is reachable
- Check that AMS Net IDs match the TwinCAT configuration
- Ensure port 48898 (or 8016 for TLS) is not blocked by a firewall
- Review Gateway logs: **Status > Diagnostics > Logs**

Tags show bad quality:

- Verify the variable exists in the PLC program
- Check spelling and case sensitivity
- Ensure the PLC program is running

TLS connection fails:

- For TLS-PSK: verify the identity and key match on both sides
- For TLS-SSC: check that route credentials are correct
- For TLS-SCA: ensure both certificates are signed by the same CA

Docker related issues

When running `Ignition` inside `Docker`, the host receives an IP address on the Docker-internal network. When connecting to the PLC, the connection originates from one of the host's IP addresses. In this case the connection needs a **Source AMS Net ID** that refers to the host's IP address (and the **Local Address** in Advanced Transport Settings can be used to pin the originating interface).

Usually setting the **Source AMS Port** is also required. Its value does not really matter — setting it to `54321` usually works.

VPN related issues

When connecting to a remote PLC over a VPN, depending on the VPN type the host usually gets assigned a local VPN IP address. As with Docker, set a **Source AMS Net ID** that references this assigned IP address.

Usually setting the **Source AMS Port** is also required. Its value does not really matter — setting it to `54321` usually works.