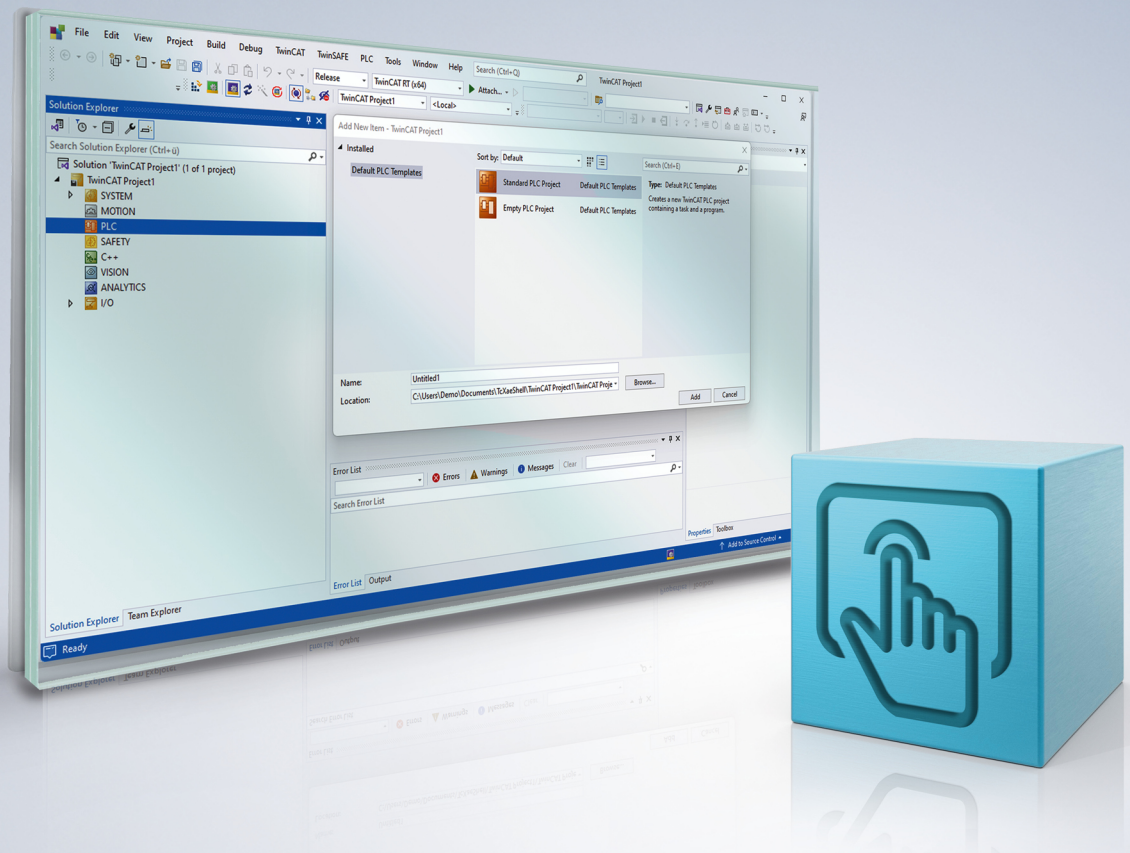
BECKHOFF New Automation Technology

Manual | EN

TF2000

TwinCAT 3 | HMI Server



2026-07-27 | Version: 1.8.0

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1 Foreword

1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
The documentation and the following notes and explanations must be complied with when installing and commissioning the components.
The trained specialists must always use the current valid documentation.

The trained specialists must ensure that the application and use of the products described is in line with all safety requirements, including all relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been compiled with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
Claims to modify products that have already been supplied may not be made on the basis of the data, diagrams, and descriptions in this documentation.

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1.2 For your safety

Safety regulations

Read the following explanations for your safety.
Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

Exclusion of liability

All the components are supplied in particular hardware and software configurations which are appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our https://www.beckhoff.com/secguide.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

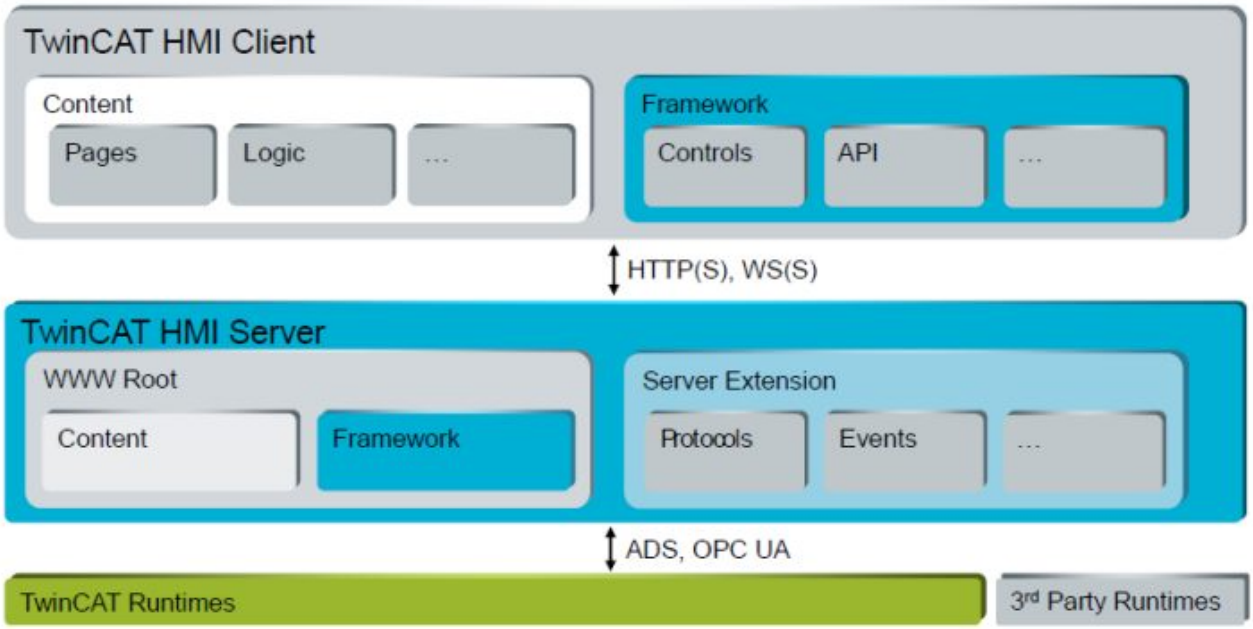
To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

2 Overview

2.1 Product description

The TwinCAT HMI server is a web server that was developed in-house by Beckhoff. It is platform-independent and not based on any web server functionalities of the operating system. The TwinCAT HMI server has a modular structure. Via server extensions it can provide additional functionalities such as a reporting system or other protocols. This enables customers to develop their own server extensions, so that their business logic can be provided centrally.

The TwinCAT HMI server supports the TwinCAT ADS protocol and can therefore communicate with all TwinCAT devices. Third-party systems can be connected via OPC UA extensions.



3 Installation

3.1 System requirements

Version 1.14

Technical Data	TF2000 | TwinCAT 3 HMI Server
Min. TwinCAT version	3.1.4024.0 from HMI server version 14.3 via setup 3.1.4026.0 from HMI server version 14.1 via TcPkg
Min. TwinCAT-Level Build 4024	TC1000 | TwinCAT 3 ADS
TcPkg Workload	TF2000.HMIServer.XAR
Operating system	Windows 10, Windows 11 TwinCAT/BSD Beckhoff RT Linux®

Version 1.12

Technical Data	TF2000 | TwinCAT 3 HMI Server
Min. TwinCAT version	3.1.4024.0
Min. TwinCAT level	TC1000 | TwinCAT 3 ADS
Operating system	Windows 10, Windows 11 Windows CE7 TwinCAT/BSD

Version 1.10

Technical Data	TF2000 | TwinCAT 3 HMI Server
Min. TwinCAT version	3.1.4022.0
Min. TwinCAT level	TC1000 | TwinCAT 3 ADS
Operating system	Windows 7/8/10

3.2 Installation

There are different ways to install the TF2000 HMI Server. Depending on the operating system, this can be done via a setup or via package management.

3.2.1 Version <= 1.12

Procedure for installing the TwinCAT HMI Server for Windows-based operating systems except for Windows CE7:

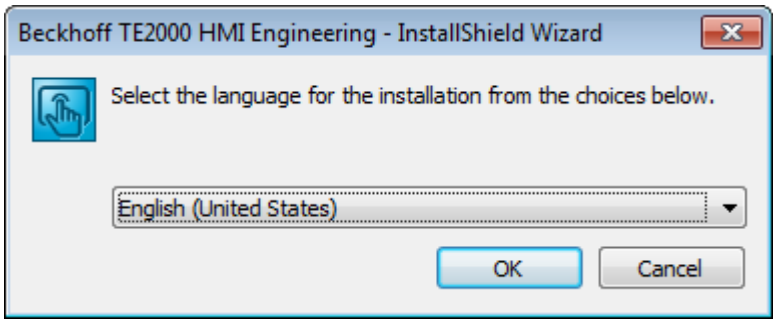
1. For an update installation, close all HMI server instances that may be running.



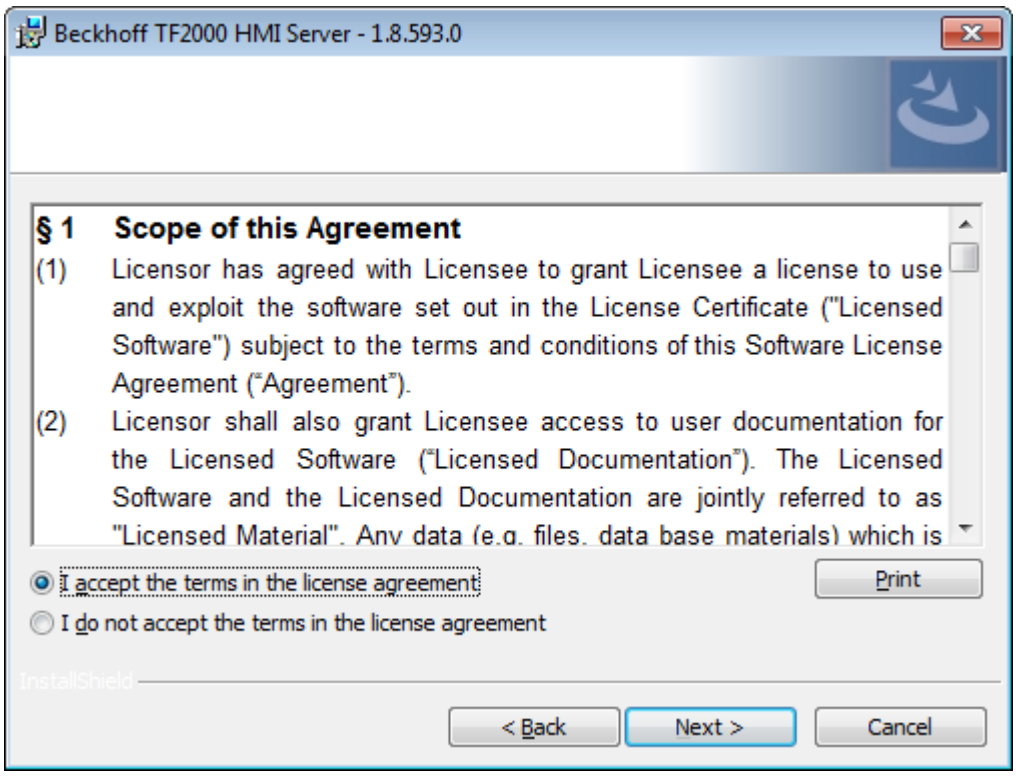
This is done automatically by the setup starting with version 1.12.

2. Double-click on the downloaded file *TF2000-HMI-Server*.
   Start the installation under Windows with **Run As Admin** by right-clicking the setup files and selecting the corresponding option in the context menu.

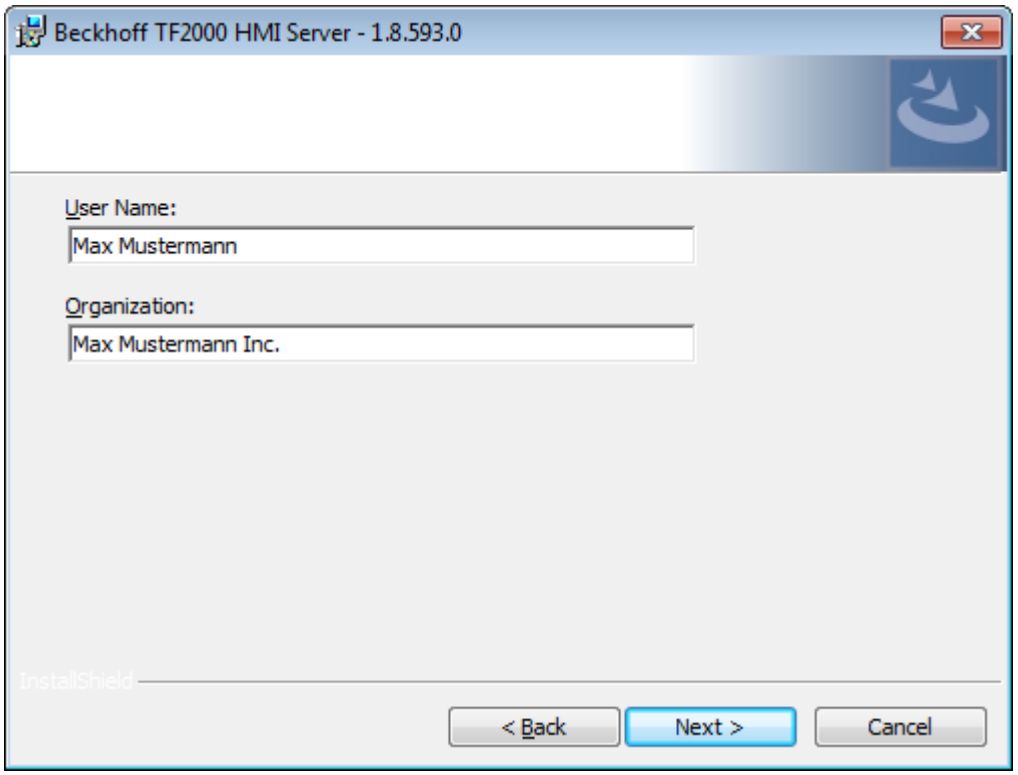
3. Select the language to guide you through the installation.



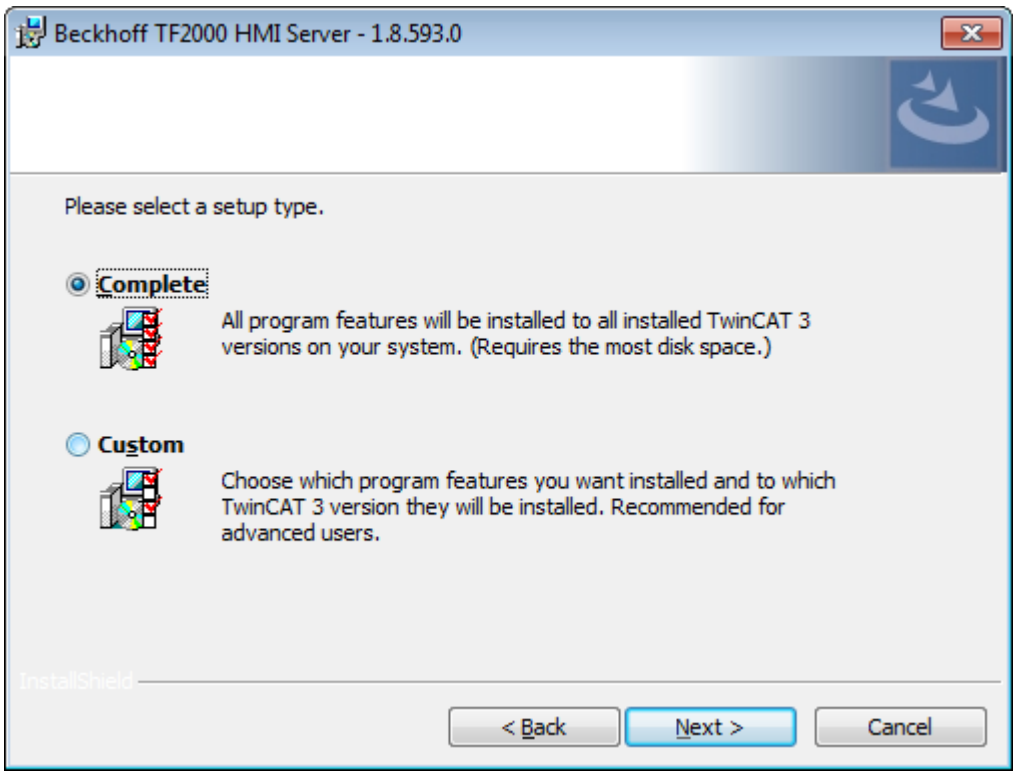
4. Click on **Next** and then accept the end user agreement.



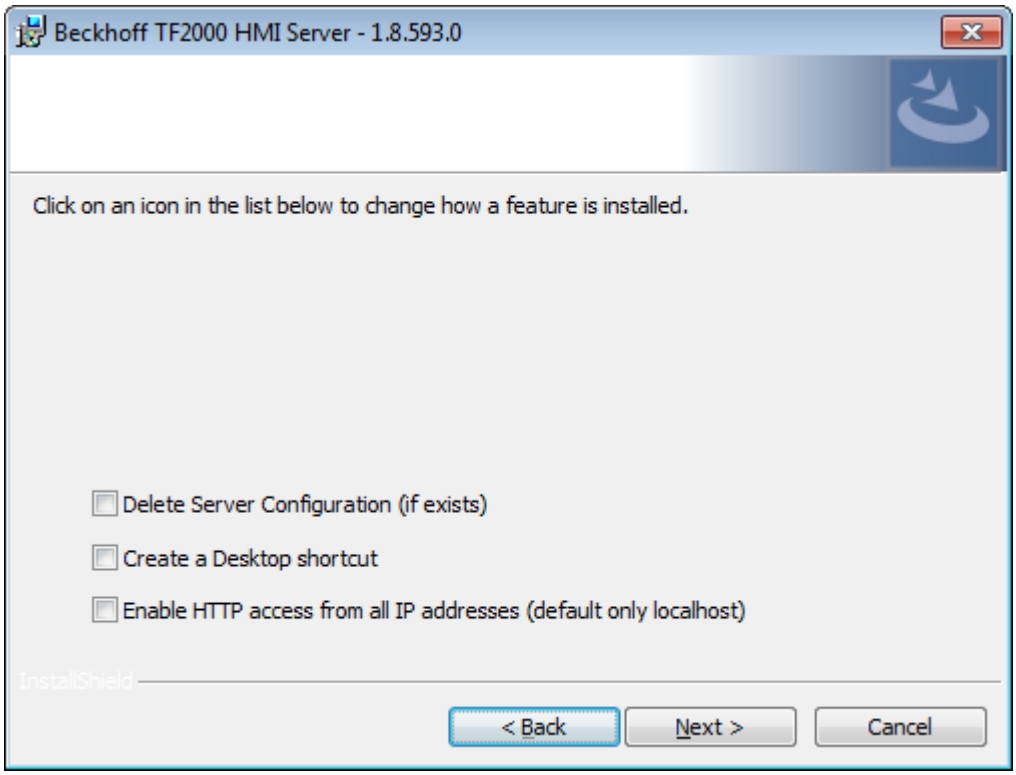
5. Enter your user data.



6. You have a choice between complete and user-specific installation. Confirm with **Next**.

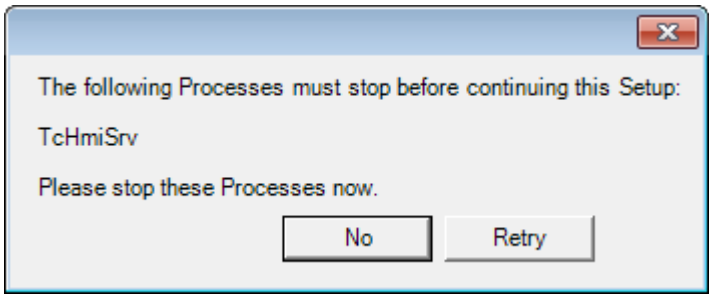


7. The user-specific installation offers the following settings:



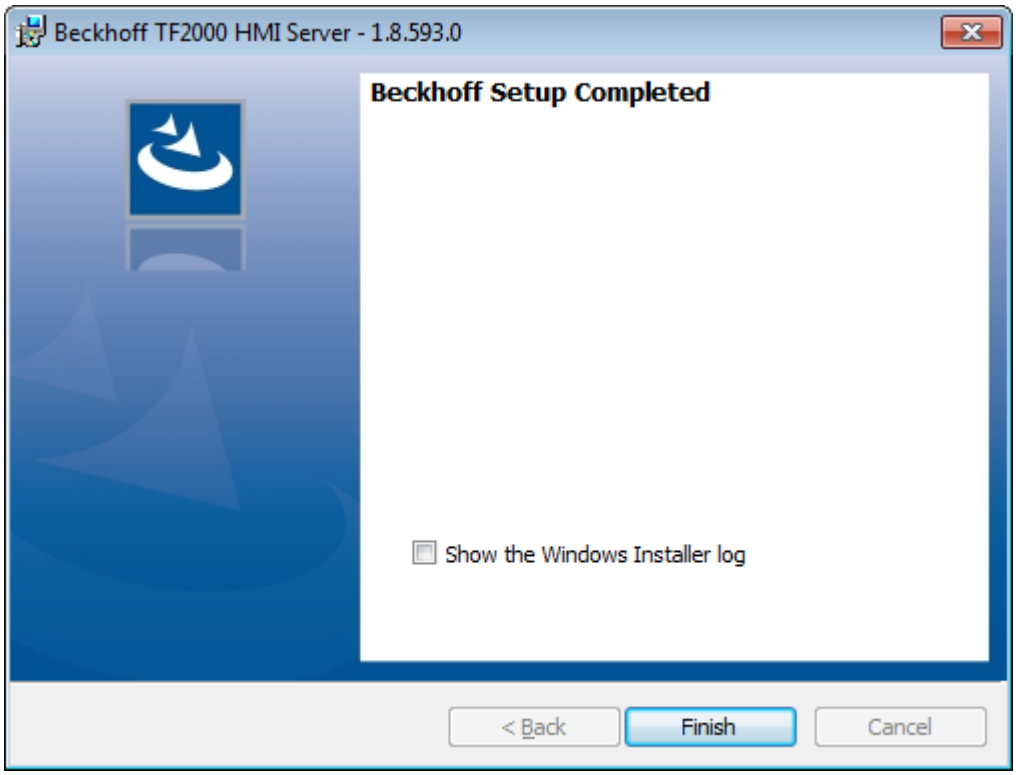
⇨ If all HMI server instances are not yet closed, the setup will pause.

8. Close all HMI server instances and click **Retry**.



This is done automatically by the setup starting with version 1.12.

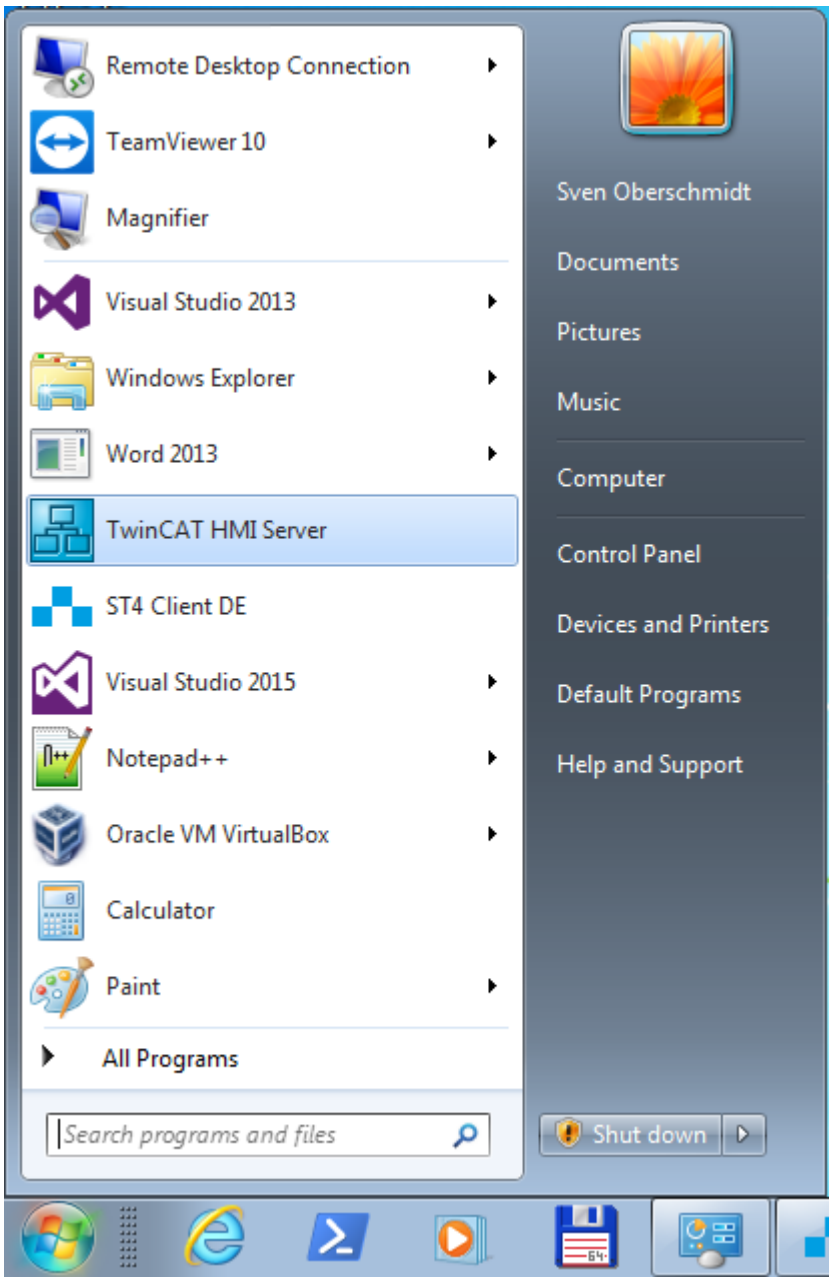
9. Select **Finish** to exit the setup.



⇨ The installation is now completed.

Version 1.10:

You can start the TF2000 HMI Server via the optional desktop shortcut or the Start menu (Programs>Beckhoff>TwinCAT HMI Server).



Version 1.12:

The TwinCAT HMI Server has been registered as a service. This means that the TwinCAT HMI Server starts automatically with the TwinCAT System Service and does not have to be started manually. You can manually stop or restart the service using the Task Manager.

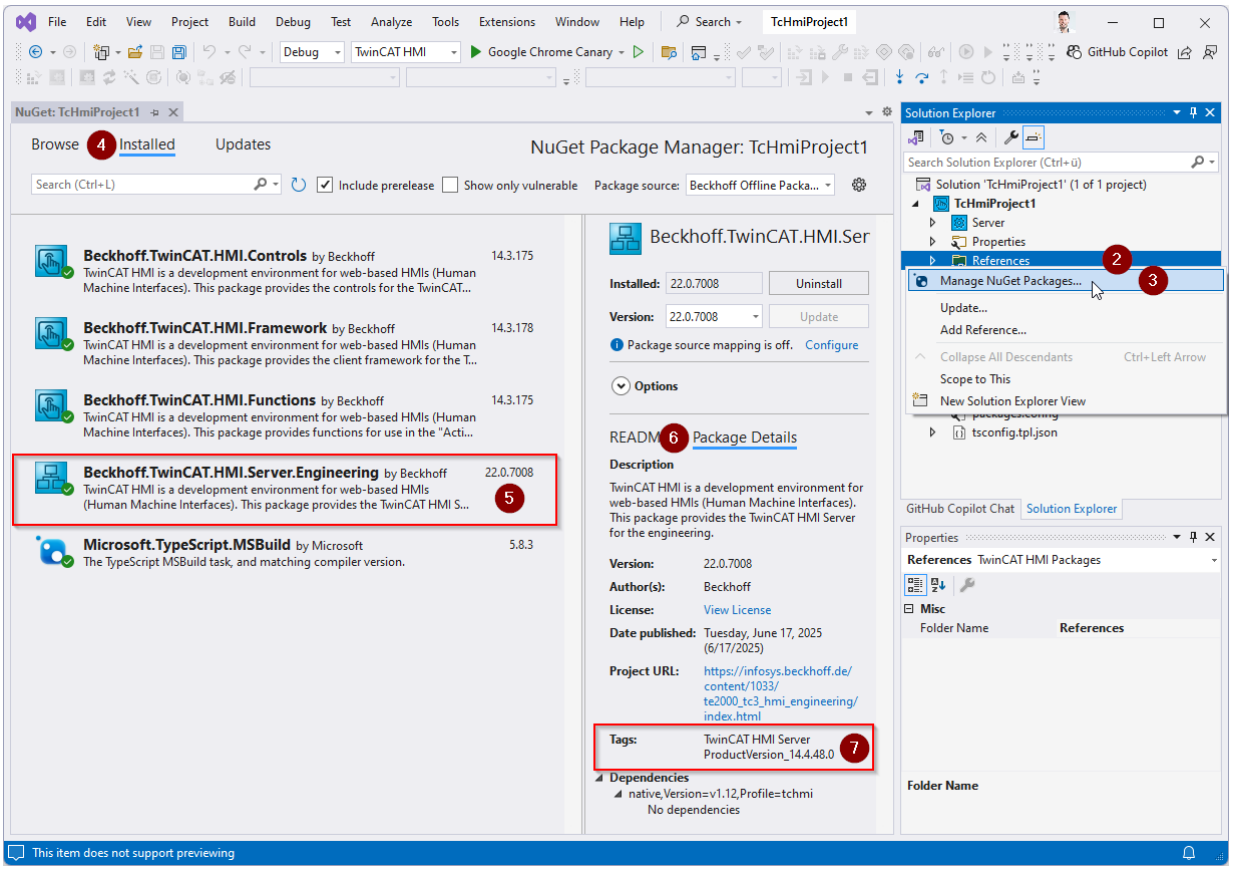
3.2.2 Version 1.14

The individual installation steps vary depending on the operating system.

Check the required server version

To check which server version is required on the target system, proceed as follows.

1. Open your TwinCAT HMI project



2. Select **References** in the Solution Explorer and right-click to open a context menu.
3. Select **Manage NuGet Packages** from the context menu.
4. Go to the **Installed** tab.
5. Select the **Beckhoff.TwinCAT.HMI.Server:Engineering** package.
6. Go to the **Package Details** tab.

⇨ Under **Tags**, you can now see the **Product Version**. This must be identical to the server on the target system.

Since version 1.14.x, no HMI server is installed in the background when installing the Engineering (TE2000). The HMI server is integrated directly into the TwinCAT HMI project using a NuGet package. This offers the advantage that there is no fixed binding between the engineering and the version of the server. This allows old projects to be opened in a new engineering without having to migrate to a new version. To update the server version in a project, the NuGet package Beckhoff.TwinCAT.HMI.Server.Engineering must be changed to the desired version.
It is not possible to downgrade the version here!

3.2.2.1 Windows

Installation Tcpkg (TwinCAT >= 4026)

PowerShell:

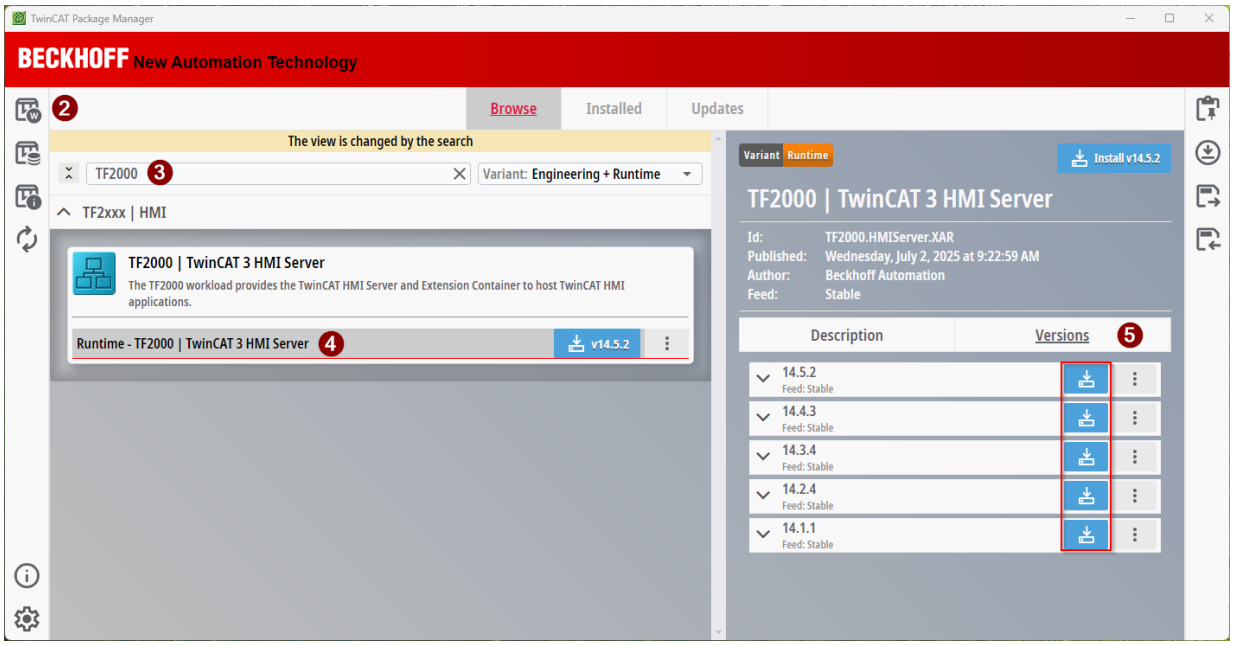
1. Open PowerShell.
2. Enter the command:

⇨ The TF2000 function has been successfully installed. The TwinCAT HMI Server starts as a service directly in the background and is available. You can manually stop or restart the service using the Task Manager.

```
tcpkg install TF2000.HMIServer.XAR
```

TwinCAT Package Manager

1. Open the TwinCAT Package Manager.



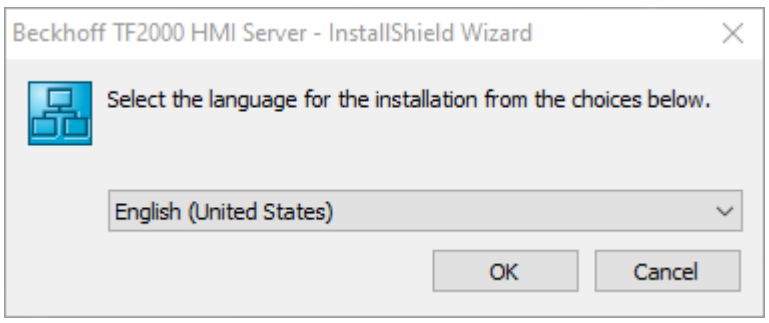
2. Select the Workloads area.
3. Search for **TF2000**.
   ⇨ The workload of the TF2000 appears.
4. Select the TF2000 to see all available versions.
5. Select the required version.
   ⇨ The version has been placed in the top right of the template for installation.
6. Click on the template at the top right.
   ⇨ A side window opens.
7. Click **Apply changes**.

⇨ The TF2000 function has been successfully installed. The TwinCAT HMI Server starts as a service directly in the background and is available. You can manually stop or restart the service using the Task Manager.

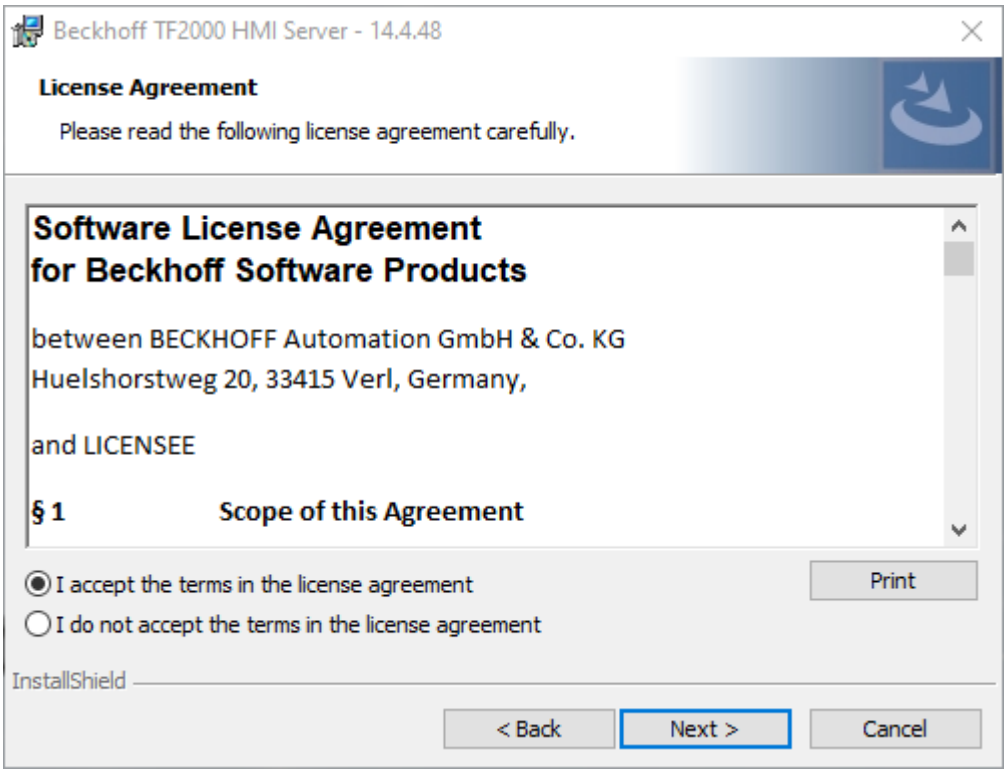
Installation Setup (only for TwinCAT <= 4024)

To install the TwinCAT HMI Server for Windows-based operating systems, proceed as follows:

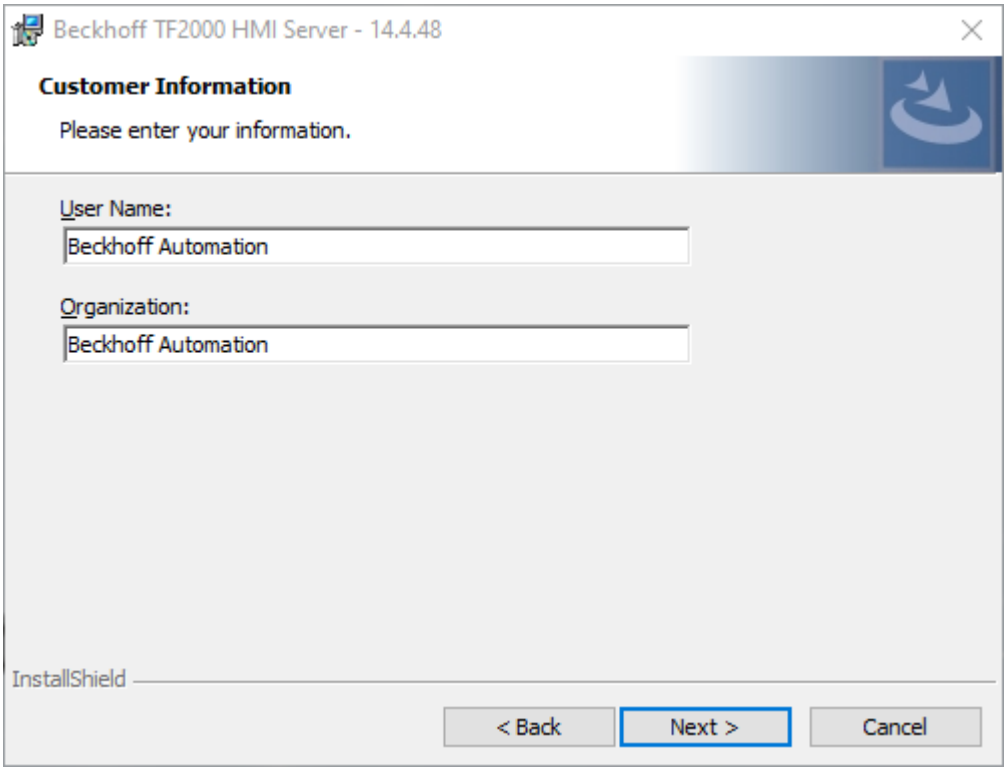
1. Start the setup as administrator.
   Right-click to open the context menu to start the installation as administrator.
2. Select the language to guide you through the installation.



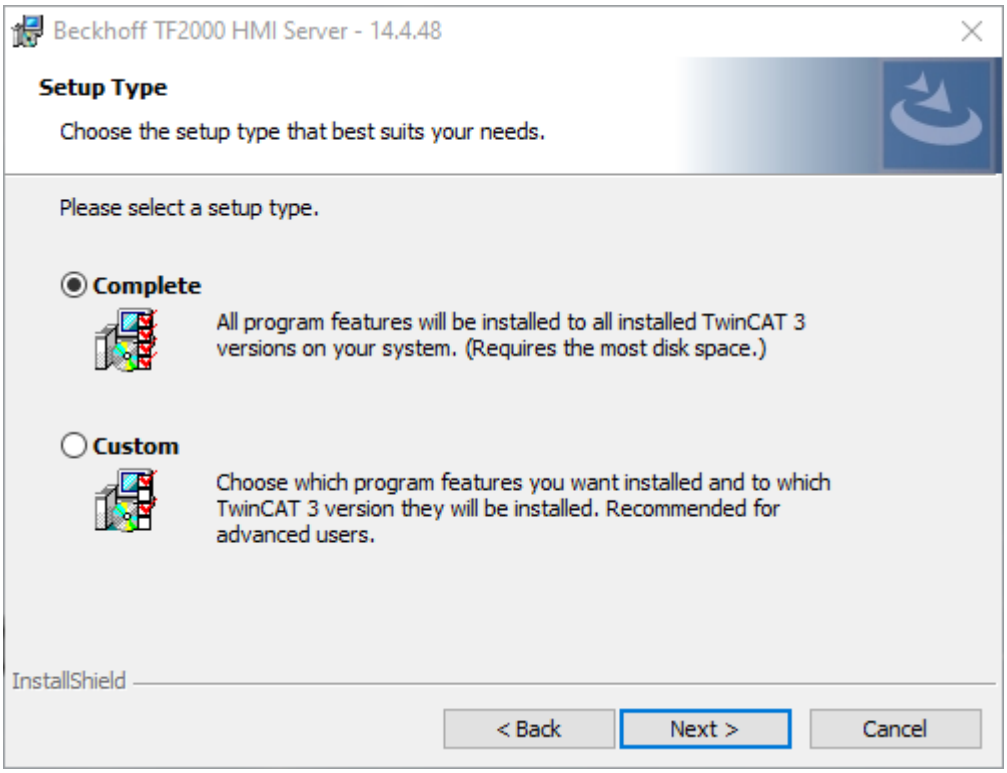
3. Check the license agreement



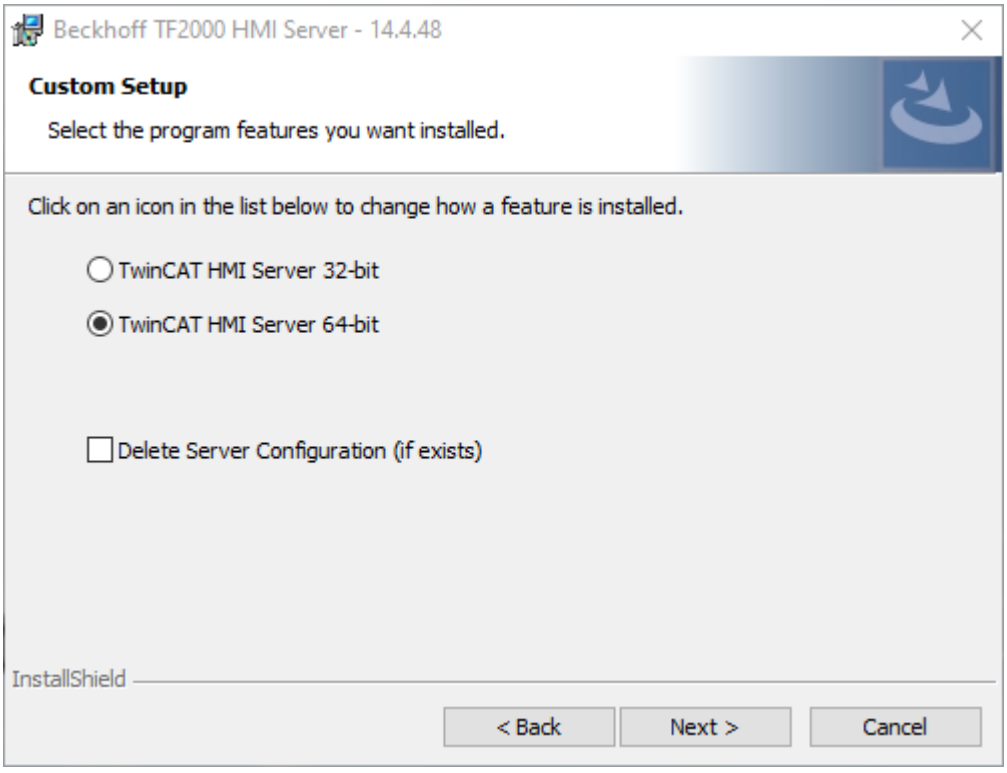
4. Enter your information.



5. Select between a Complete or Custom installation.



6. Select the options you require.



⇨ The TF2000 function has been successfully installed. The TwinCAT HMI Server starts as a service directly in the background and is available. You can manually stop or restart the service using the Task Manager.

3.2.2.2 Beckhoff RT Linux®

Installation

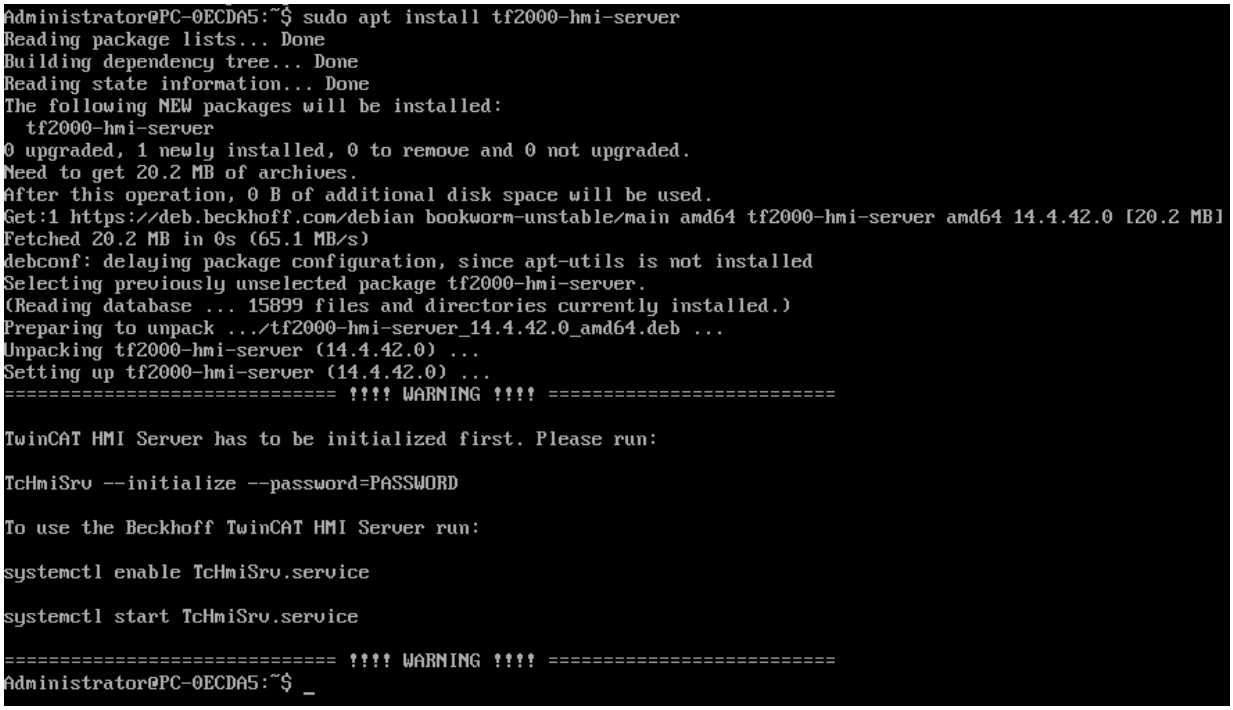
1. Use the CLI directly on your device. Alternatively, you can also connect via SSH.
2. Log in as an administrator.
3. Update the packages in the Package Manager.

```
sudo apt update
```

4. Search for the existing TF2000 packages.

```
sudo apt search tf2000
```

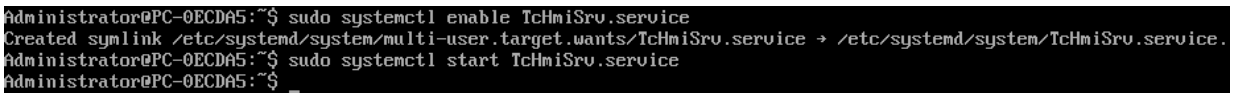
5. Install TF2000 via the Package Manager.



⇨ The server has been successfully installed.
/etc/TwinCAT/Functions/TF2000-HMI-Server/

```
sudo apt install tf2000-hmi-server
```

6. Initialize the HMI server.
Initialization under Beckhoff RT Linux® [▶ 30]
7. Start the server.



⇨ The server has been successfully started.

```
sudo systemctl enable TcHmiSrv.service
sudo systemctl start TcHmiSrv.service
```

3.2.2.3 TwinCAT/BSD

Installation

1. Use the CLI directly on your device. Alternatively, you can also connect via SSH or the web interface.
2. Log in as an administrator.
3. Update the packages in the Package Manager.

```
doas pkg update
```

4. Search for the existing TF2000 packages.

```
pkg search TF2000
```

5. Install TF2000 via the Package Manager.

```
Administrator@PC-FC13AA:~ $ doas pkg install TF2000-HMI-Server-14.3.173.0
Password:
Updating TCBSD repository catalogue...
TCBSD repository is up to date.
All repositories are up to date.
The following 1 package(s) will be affected (of 0 checked):

New packages to be INSTALLED:
        TF2000-HMI-Server: 14.3.173.0

Number of packages to be installed: 1

The process will require 133 MiB more space.
26 MiB to be downloaded.

Proceed with this action? [y/N]: y
[1/1] Fetching TF2000-HMI-Server-14.3.173.0.pkg: 100%   26 MiB  26.9MB/s    00:01
Checking integrity... done (0 conflicting)
[1/1] Installing TF2000-HMI-Server-14.3.173.0...
[1/1] Extracting TF2000-HMI-Server-14.3.173.0: 100%
=====
Message from TF2000-HMI-Server-14.3.173.0:

--
============================== !!!! WARNING !!!! ==========================

TwinCAT HMI Server has to be initialized first. Please run:

doas TcHmiSrv --initialize --password=PASSWORD

FreeBSD package manager doesn't allow us to automatically start services
during package installation. To use the Beckhoff TwinCAT HMI Server either
restart your system or start 'TcHmiSrv' manually with:

doas service TcHmiSrv start

============================== !!!! WARNING !!!! ==========================
Administrator@PC-FC13AA:~ $
```

⇨ The server has been installed successfully.
/usr/local/etc/TwinCAT/Functions/TF2000-HMI-Server

```
doas pkg install TF2000-HMI-Server-<Version>
```

6. Initialize the HMI server.
Initialization under TwinCAT/BSD [▶ 32]
7. Start the server.

```
Administrator@PC-FC13AA:~ $ doas service TcHmiSrv start
Password:
Starting TcHmiSrv.
Administrator@PC-FC13AA:~ $
```

⇨ The server has been successfully started.

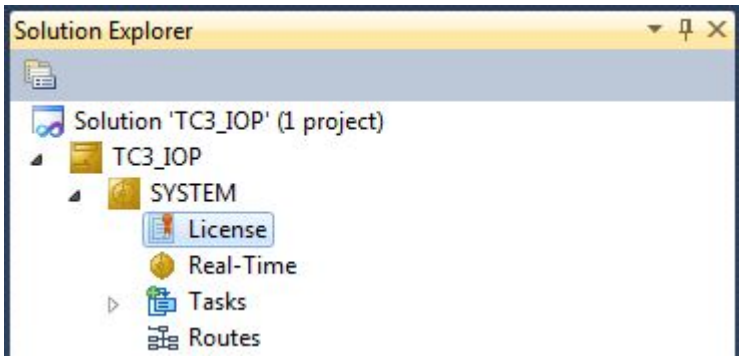
```
doas service TcHmiSrv start
```

3.3 Licensing

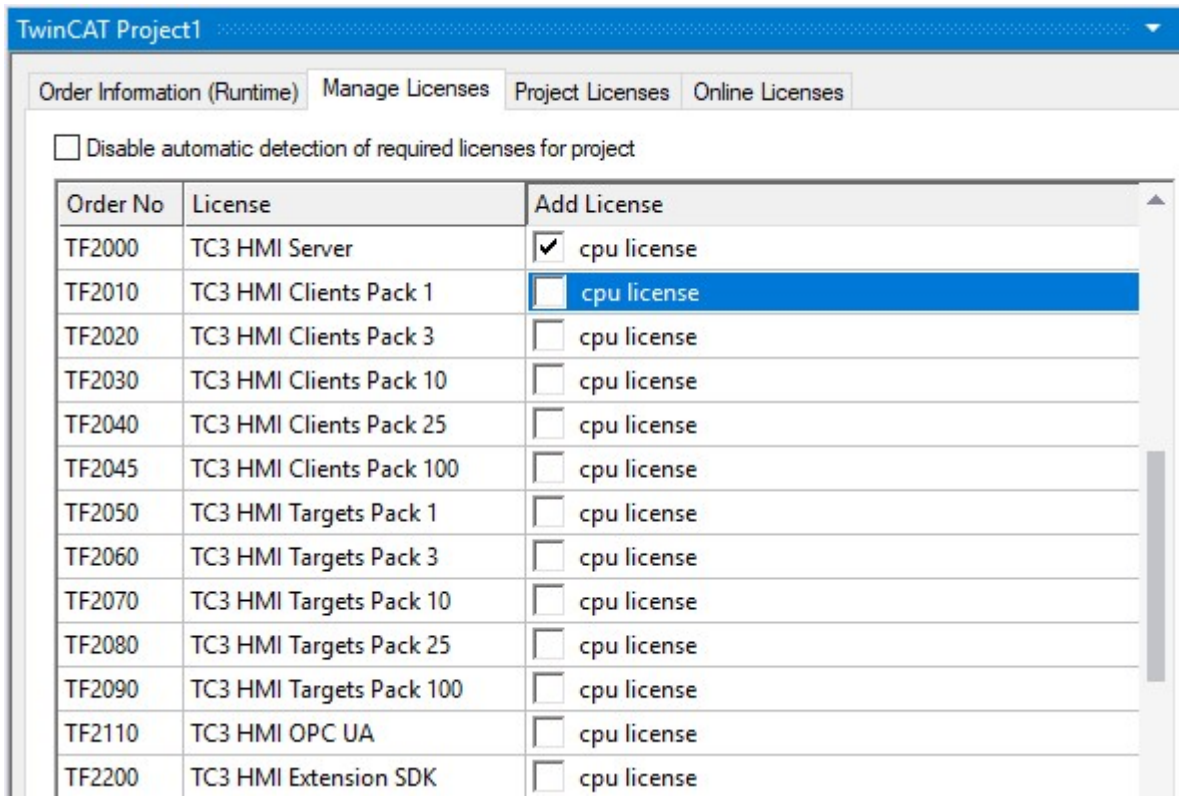
Licensing a full version

1. Start TwinCAT XAE
2. Open an existing TwinCAT 3 project or create a new project

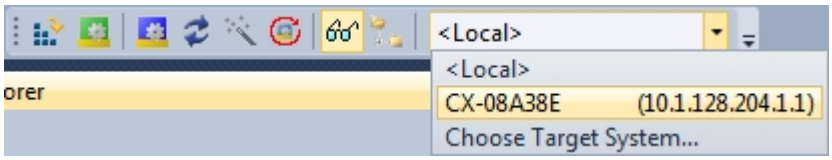
3. In the **Solution Explorer**, navigate to the entry **SYSTEM/License**



4. Open the **Manage Licenses** tab and add a **Runtime License** for your product (in this screenshot **TF2000: TC3 HMI Server**).

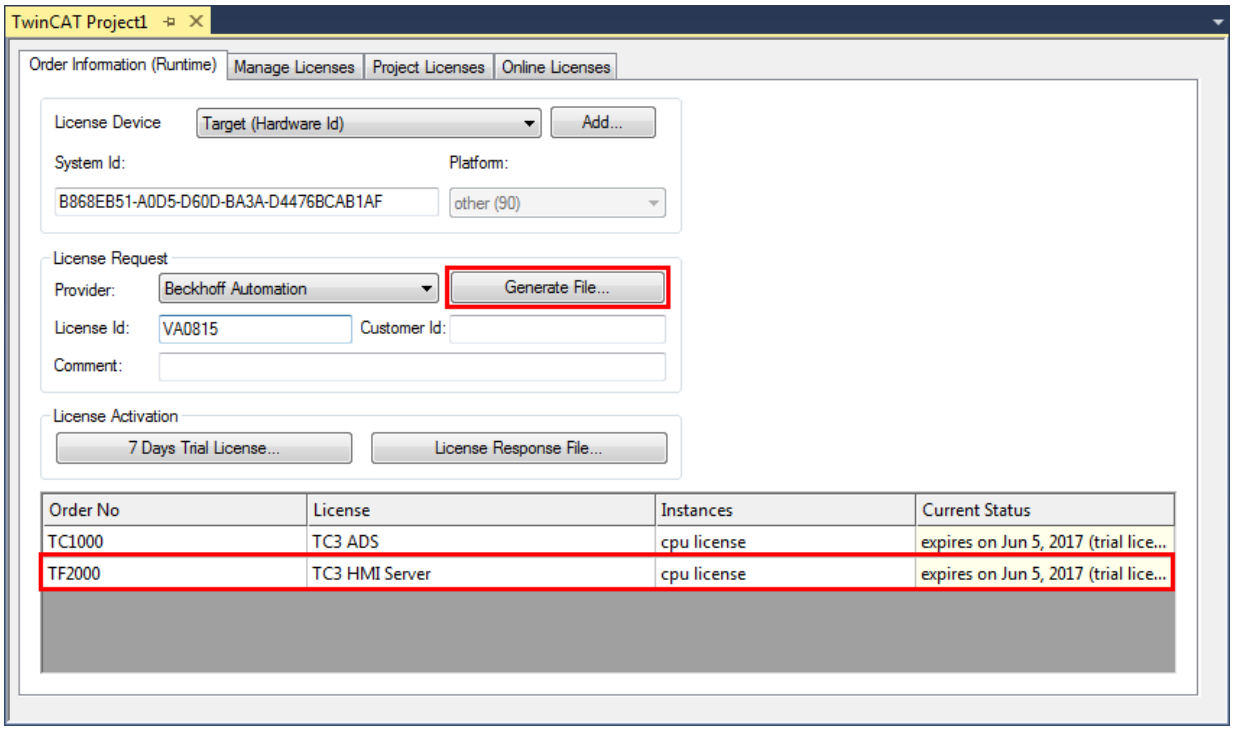


5. **Optional:** If you wish to add the license for a remote device, you must first connect to this device via the TwinCAT XAE toolbar

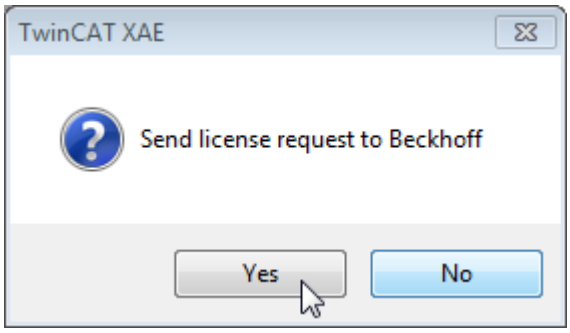


6. Open the **Order Information** tab. The **System ID** and **HW Platform** fields cannot be changed. They describe the platform to be licensed. In general, a TwinCAT 3 license is bound to two key figures:
The **System ID** uniquely identifies your device.
The **HW platform** is a key figure for the performance of the device.

7. Optionally, you can enter your own order number and a comment for your own needs



8. On the **Order Information** tab, click the **Generate License Request File...** button to generate a license request file that is validated by a Beckhoff license server (if you do not know your **Beckhoff License ID** , contact your Beckhoff sales representative).
9. After you have saved the License Request File, the system asks whether the file should be sent to the Beckhoff license server by email:

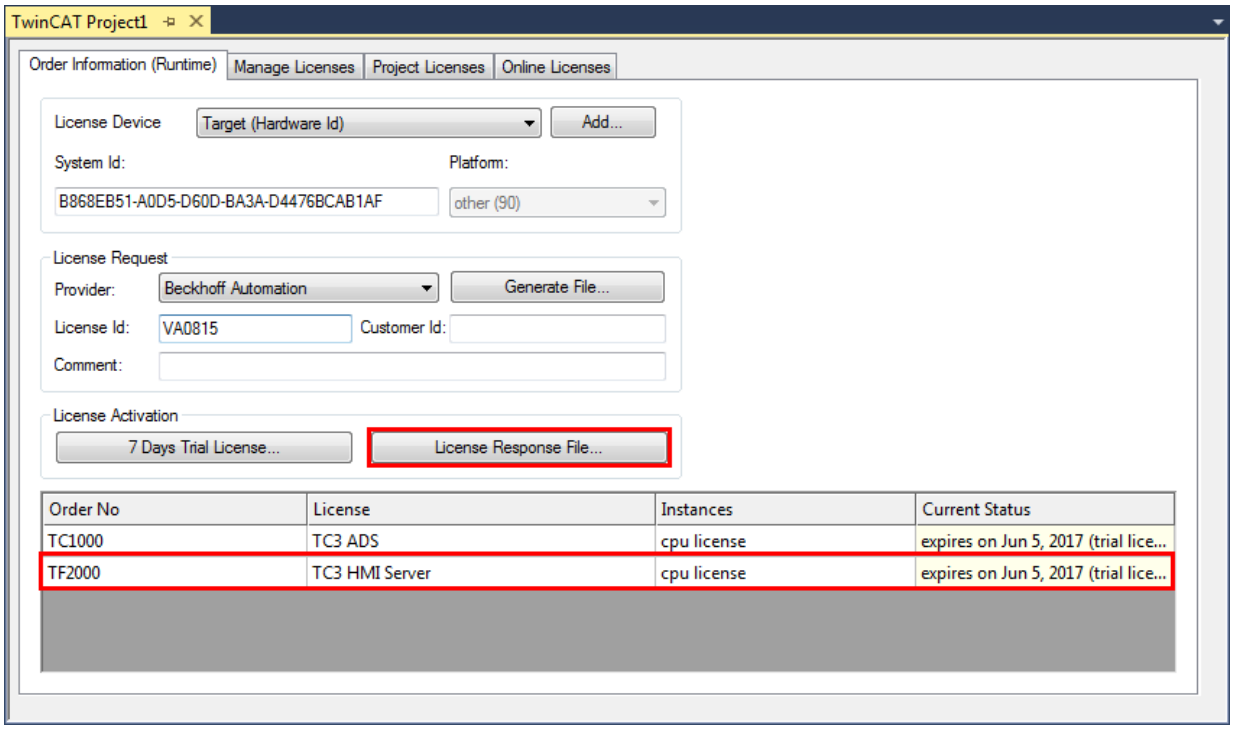


10. If you confirm the dialog with **Yes**, your default email client opens and creates a new email for tclicense@beckhoff.com containing the license request file.
11. Send this activation request to Beckhoff

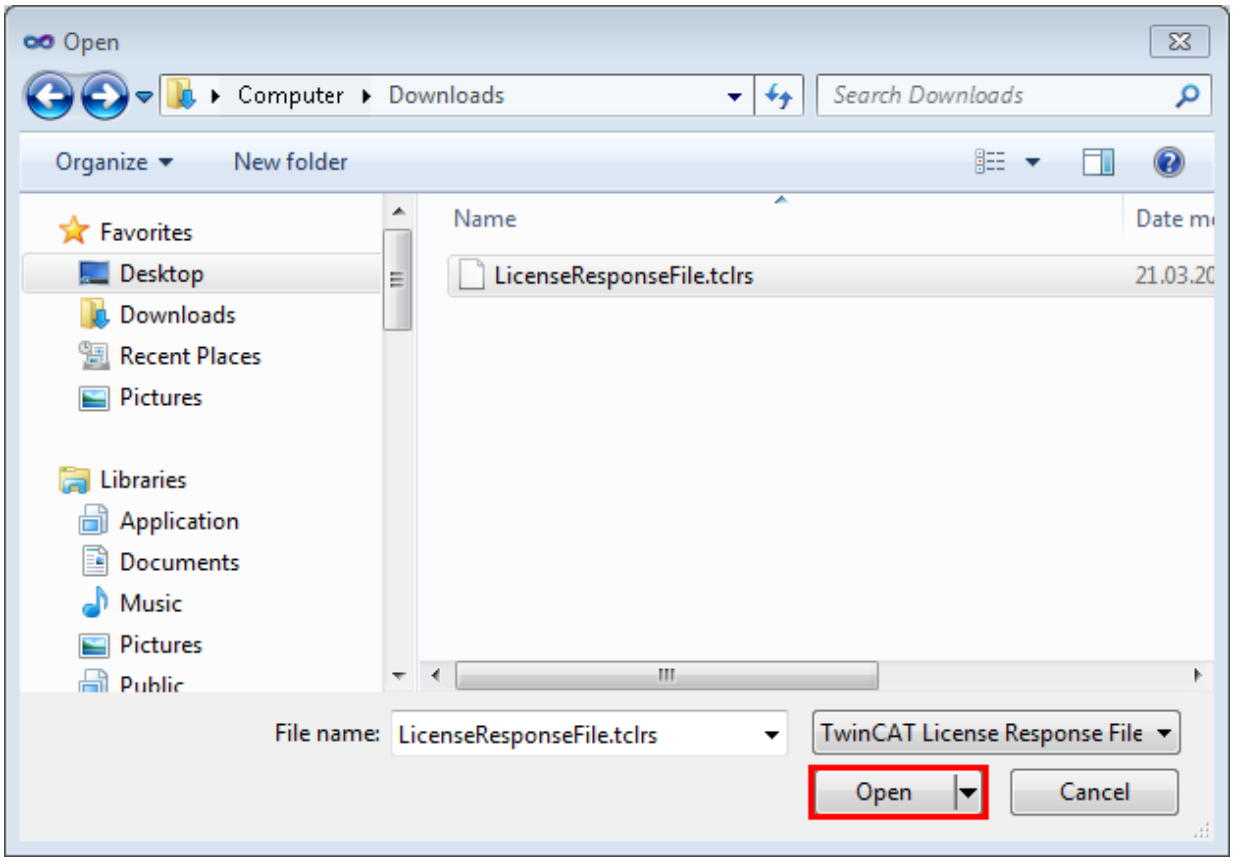


The License Response File is sent to the same email address that sent the License Request File.

12. Shortly afterwards, you will receive a license file from the Beckhoff license server.
Import the file via the **Activate License Response File...** button to activate the product

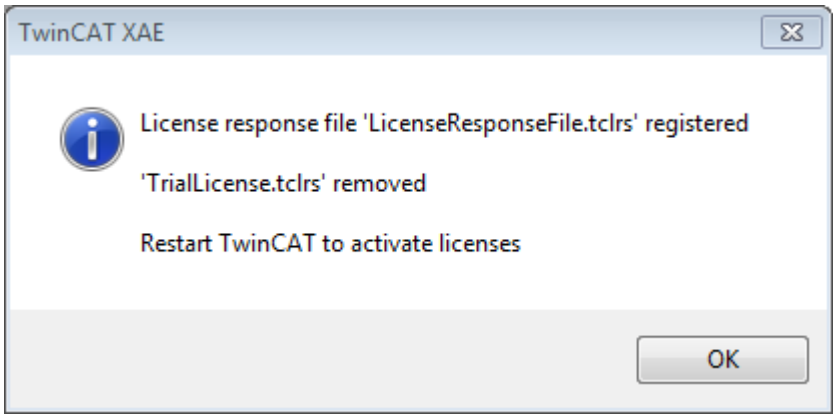


13. Select the **License Response File** you received in your folder system



14. The License Response File is imported and all licenses contained in it are activated (all affected demo licenses are removed)

15. Restart TwinCAT to activate the license



⇨ The license file is automatically copied to your local hard disk under ...\TwinCAT\3.1\Target\License.

4 Configuration

After installation, the TwinCAT HMI Server must be initialized. This varies depending on the TwinCAT HMI version.

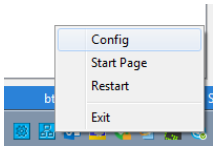
4.1 Version <= 1.12

After installation, the TwinCAT HMI Server must be initialized.

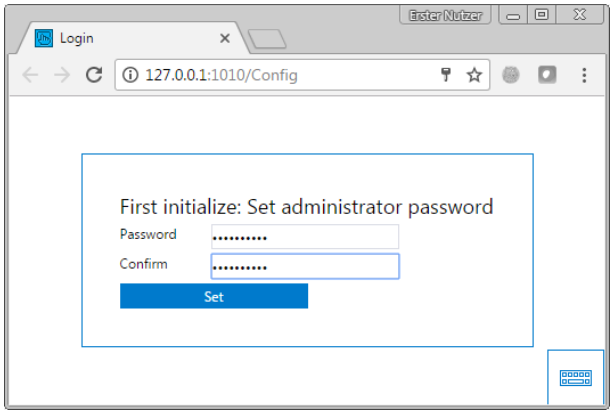
Initializing the TwinCAT HMI Server under Windows

Assign a default password for the system administrator so that the HMI server can be configured and the HMI engineering can access it.

After starting the server you can use the **System tray**  to call the configuration page of the server.



Assign a password for the system administrator when you call up the page for the first time.



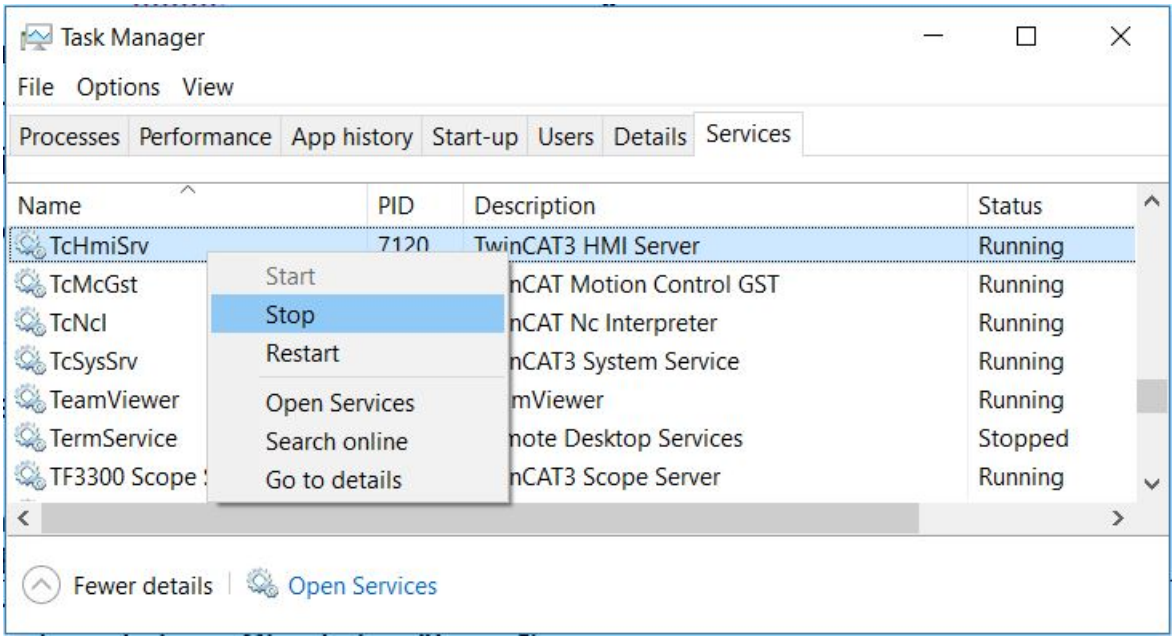
The configuration and the published HMI project can be found under *\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server*.
To reset the server, you can delete the directory.
To back up or delete the files, stop the server.

4.1.1 Start more instances

Since version 1.12, multiple server instances can be started on one system. This function is included in the basic TF2000 license. The target and client licenses are shared among the server instances, so you need licenses for the sum of all connected targets or clients.

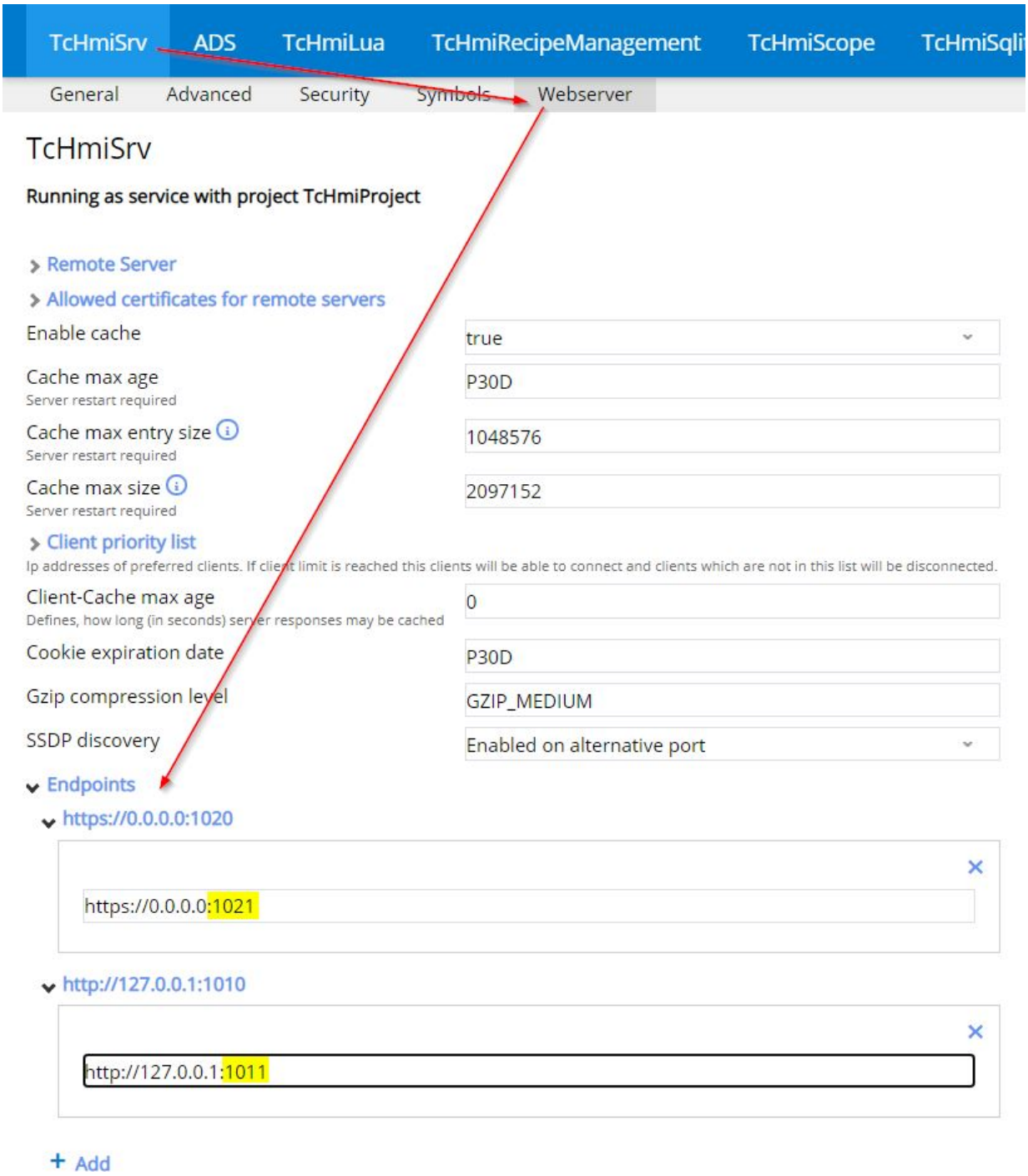
To start another server instance, proceed as follows:

1. Stop the service from the TwinCAT HMI Server (**TcHmiSrv**). You can do this in the Task Manager under the services:



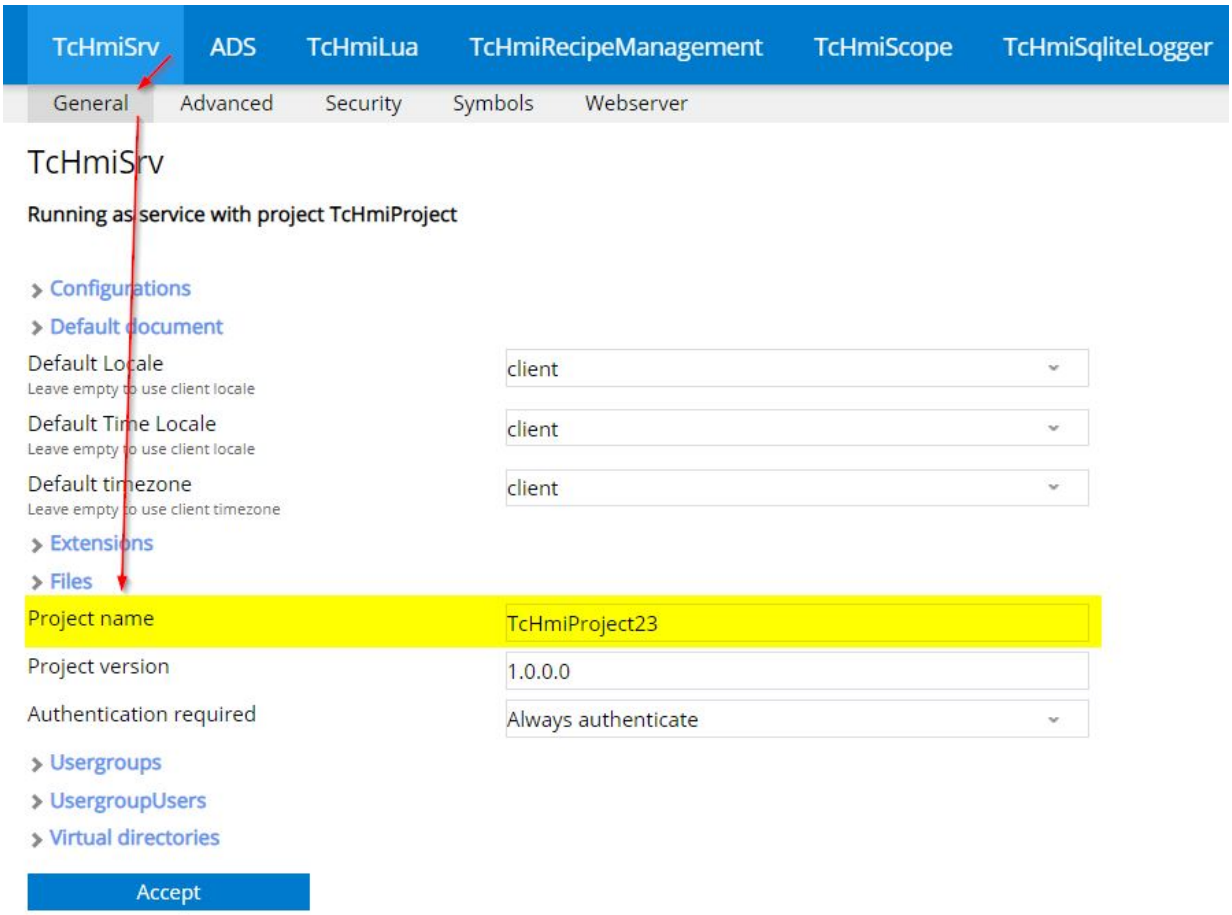
2. Navigate to the following folder on the system hard disk:
   C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service.
3. Create a new folder for the additional server instance. The folder name specifies the name of the instance. The default instance has the name "*TcHmiProject*".
4. Start the service again via the Task Manager.
   ⇨ There are now multiple server instances initially running on the same port. Since this is not allowed, the ports must be changed.

5. Open the configuration page of the default server instance at **TcHmiSrv - Web server** and change the ports to free ports.



6. Confirm the changes by clicking **Accept** at the bottom of the page.

7. Change the name of the instance at **TcHmiSrv - General** and confirm the changes by clicking on **Accept**. Enter the name you used for the folder name here.



8. Repeat the procedure from steps 3 to 7 for additional server instances.

⇨ The server instances are now accessible via different ports.

In the future, a service management page will be provided in the TwinCAT HMI server which will make it easy to create further instances.

Available from version 1.12.

4.2 Version 1.14

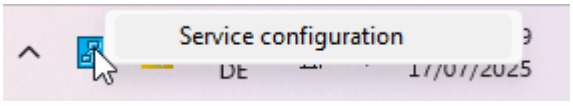
The individual steps for initializing the TwinCAT HMI Server vary depending on the operating system.

4.2.1 Windows

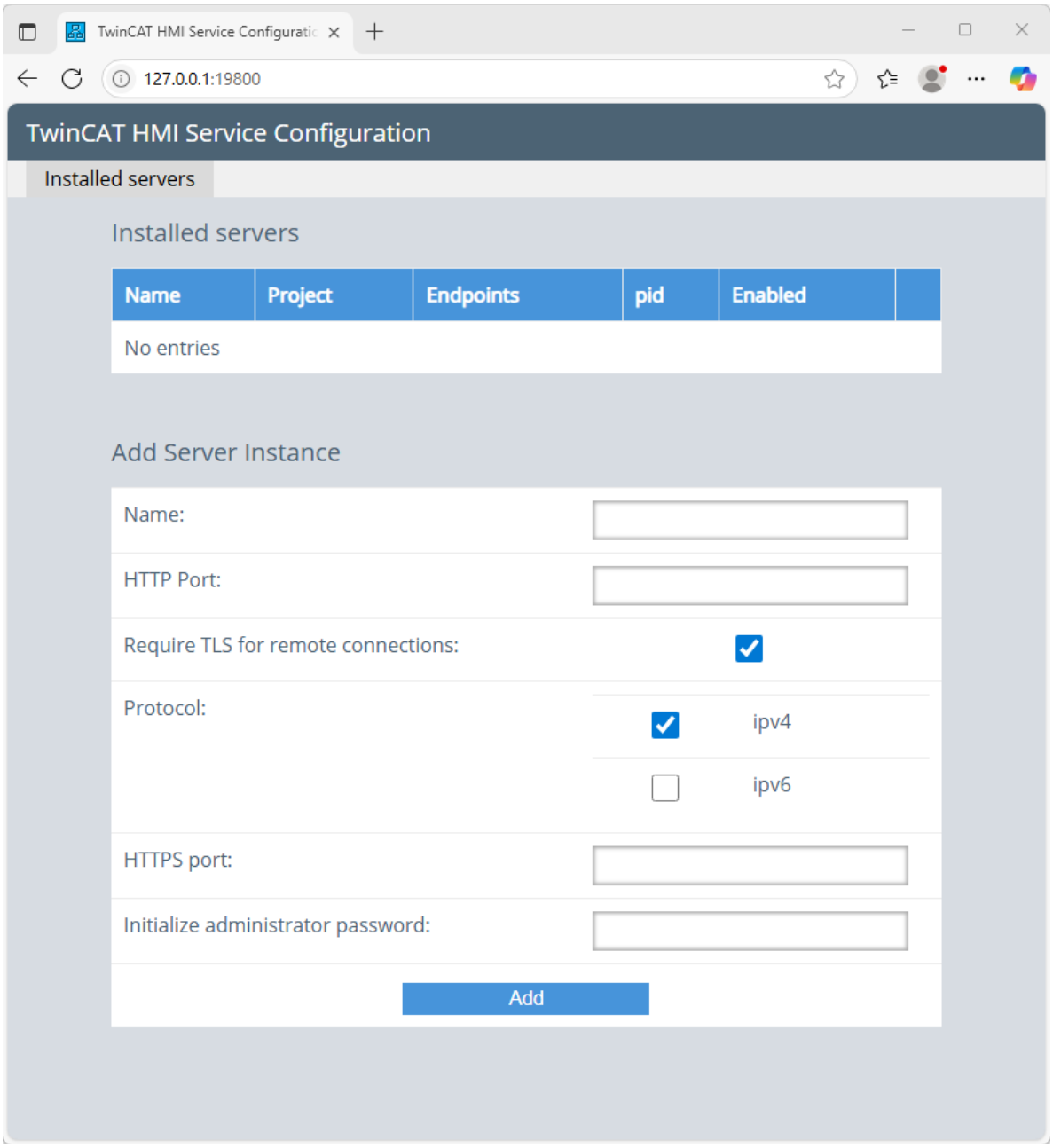
In the first step, the server was installed and runs as a service in the background. Immediately after installation, the server does not yet have a server instance. To create a new server instance, proceed as follows.

Initializing the TwinCAT HMI Server

1. Open the *Service configuration* of the server.
   Right-click on the TcHmi icon in the taskbar or via the browser http://127.0.0.1:19800/

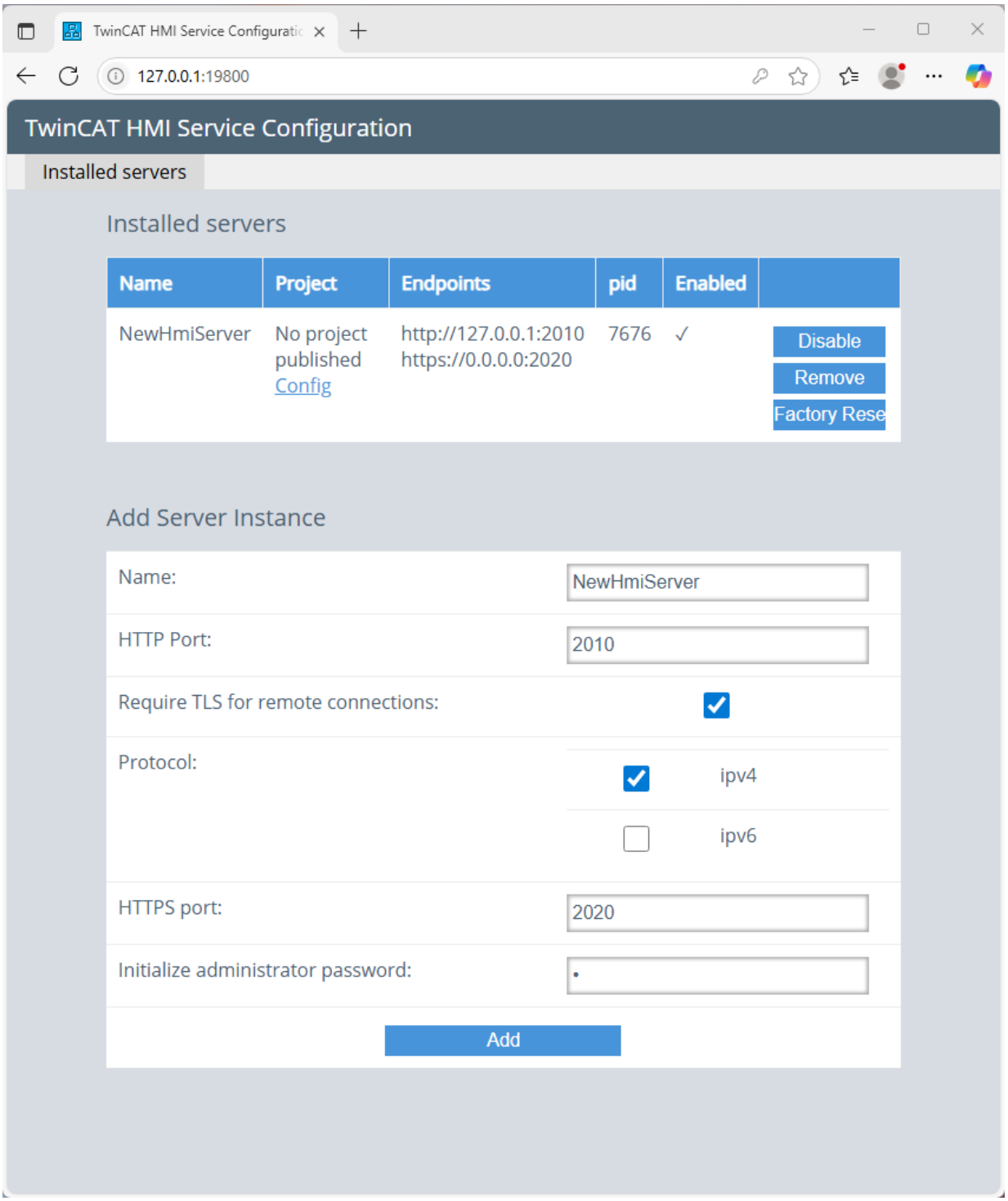


⇨ The *Service configuration* of the server opens in the browser



2. Add a new server instance.
   Default Port HTTP 2010 and HTTPS 2020

⇨ A new instance was successfully added to the path *C:\ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server\service* and is displayed in the *Installed Servers* table.



4.2.2 Beckhoff RT Linux®

Initializing the TwinCAT HMI Server

1. Use the CLI directly on your device. Alternatively, you can also connect via SSH.
2. Log in as an administrator.
3. Initialize the server.

```
sudo TcHmiSrv --initialize --password=<Passwort>
```

4. You can also pass the following additional parameters
   --endpoint=http://127.0.0.1:2010 / Creates a local endpoint for http on port 2010
   --name=MyProject / Creates the server instance with the corresponding name

```
Administrator@PC-0ECDA5:~$ sudo TcHmiSrv --initialize --password=1
Adding service instance /etc/TwinCAT/Functions/TF2000-HMI-Server/service/TcHmiProject.
[II TcHmiSrv] Domain 'TcHmiSqliteLogger' initialized
[VV TcHmiSrv] The temporary events of the 'TcHmiSqliteLogger' domain were reset.
[II TcHmiSrv] Domain 'TcHmiUserManagement' initialized
[VV TcHmiSrv] The temporary events of the 'TcHmiUserManagement' domain were reset.
Password initialized
[II TcHmiSqliteLogger] Shutdown extension TcHmiSqliteLogger succeeded.
Administrator@PC-0ECDA5:~$
```

⇨ The server has been initialized.
/etc/TwinCAT/Functions/TF2000-HMI-Server/service (Server < 14.5.73)
/var/lib/tchmisrv/service (Server >= 14.5.73)
To display further settings, use the command

```
TcHmiSrv --help
```

Whitelisting of further paths

1. Use the CLI directly on your device. Alternatively, you can also connect via SSH.
2. Log in as an administrator.
3. Open the configuration of the TcHmiSrv service.

```
sudo systemctl edit TcHmiSrv
```

4. Enter the required paths in the configuration.
   Example entry:

```
[Service]
ReadWritePaths=/path/to/your/extension_files
ExecPaths=/path/to/your/executables
```

5. Save and close the file.

⇨ The configuration was modified successfully.

Firewall

1. Create a configuration file in */etc/nftables.conf.d/*, named 20-hmi.conf, for example.

```
sudo nano /etc/nftables.conf.d/20-hmi.conf
```

2. Insert the following content and adjust the values to your network requirements:

```
table inet filter {
  chain input {
    # accept TcHmi
    tcp dport 2020 accept
  }
}
```

3. Save and close the configuration file.
4. Load the new rule with the command

```
sudo systemctl reload nftables
```

5. Check the settings and make sure that the configuration has been applied correctly.

⇨ Port 2020 has been released for the HMI server.

```
sudo nft list ruleset
```

Notes on ports

By default, the creation of ports below port 1024 is not allowed. In order to run the HMI server on a lower port, the service configuration must be adapted.

1. Use the CLI directly on your device. Alternatively, you can also connect via SSH.
2. Log in as an administrator.
3. Open the configuration of the TcHmiSrv service.

```
sudo systemctl edit TcHmiSrv
```

4. Add the following entries so that the server can also run on lower ports.

```
[Service]
CapabilityBoundingSet=CAP_NET_BIND_SERVICE
AmbientCapabilities=CAP_NET_BIND_SERVICE
```

5. Save and close the file.

⇨ The configuration was modified successfully.

4.2.2.1 Commands

Overview of all commands:

```
TcHmiSrv --help
```

Initialize server:
The server is initialized in the following paths, depending on the version.
/etc/TwinCAT/Functions/TF2000-HMI-Server/service (Server < 14.5.73)
/var/lib/tchmisrv/service (Server >= 14.5.73)

```
sudo TcHmiSrv --initialize --password=<Passwort>
```

Enable/disable server:

```
sudo systemctl enable TcHmiSrv.service
sudo systemctl disable TcHmiSrv.service
```

Server start/stop/restart:

```
sudo systemctl start TcHmiSrv.service
sudo systemctl stop TcHmiSrv.service
sudo systemctl restart TcHmiSrv.service
```

Factory reset:

Reset all services.

```
sudo TcHmiSrv --factoryReset --serviceDir=/var/lib/tchmisrv/service
```

Reset a specific service.

```
sudo TcHmiSrv --factoryReset --serviceDir=/var/lib/tchmisrv/service/<ServiceName>
```

Follow the steps below to reinitialize the server.

```
sudo systemctl stop TcHmiSrv.service
sudo TcHmiSrv --initialize --password=<Passwort>
sudo systemctl start TcHmiSrv.service
```

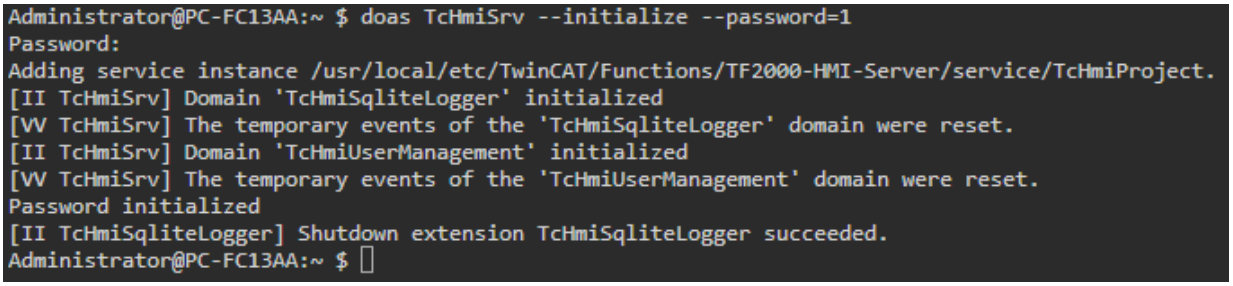
4.2.3 TwinCAT/BSD

Initializing the TwinCAT HMI Server

1. Use the CLI directly on your device. Alternatively, you can also connect via SSH or the web interface.
2. Log in as an administrator.
3. Initialize the server.

   ```
   doas TcHmiSrv --initialize --password=<Passwort>
   ```

4. You can also pass the following parameters
   --endpoint=http://127.0.0.1:2010 / Creates a local endpoint for http on port 2010
   --name=MyProject / Creates the server instance with the corresponding name



⇨ The server has been initialized in the path */usr/local/etc/TwinCAT/Functions/TF2000-HMI-Server/service*. To display further settings, use the command

```
TcHmiSrv --help
```

Firewall

1. Open pf.conf to configure the firewall.

```
doas ee /etc/pf.conf
```

2. Add the port 2020.

```
pass in quick proto tcp to port 2020 keep state
```

3. Save and exit the editor.
4. Enter the command to reload the rules. The firewall must be activated for this.

⇨ Port 2020 has been released for the HMI server.

```
doas pfctl -f /etc/pf.conf
```

4.2.3.1 Commands

Overview of all commands:

```
TcHmiSrv --help
```

Initialize server:
The server is initialized in the path */usr/local/etc/TwinCAT/Functions/TF2000-HMI-Server/service*

```
doas TcHmiSrv --initialize --password=<Passwort>
```

Server start/stop/restart:

```
doas service TcHmiSrv start
doas service TcHmiSrv stop
doas service TcHmiSrv restart
```

Factory reset:

Reset all services.

```
doas TcHmiSrv --factoryReset --storageDir=/usr/local/etc/TwinCAT/Functions/TF2000-HMI-Server/service
```

Reset a specific service.

```
doas TcHmiSrv --factoryReset --storageDir=/usr/local/etc/TwinCAT/Functions/TF2000-HMI-Server/
service/<ServiceName>
```

Follow the steps below to reinitialize the server.

```
doas service TcHmiSrv stop
doas TcHmiSrv --initialize --password=<Passwort>
doas service TcHmiSrv start
```

4.3 ADS

The Automation Device Specification is the TwinCAT communication protocol. This can be used to access the individual modules.

4.3.1 Quick start

To start, create or open a TwinCAT HMI project.

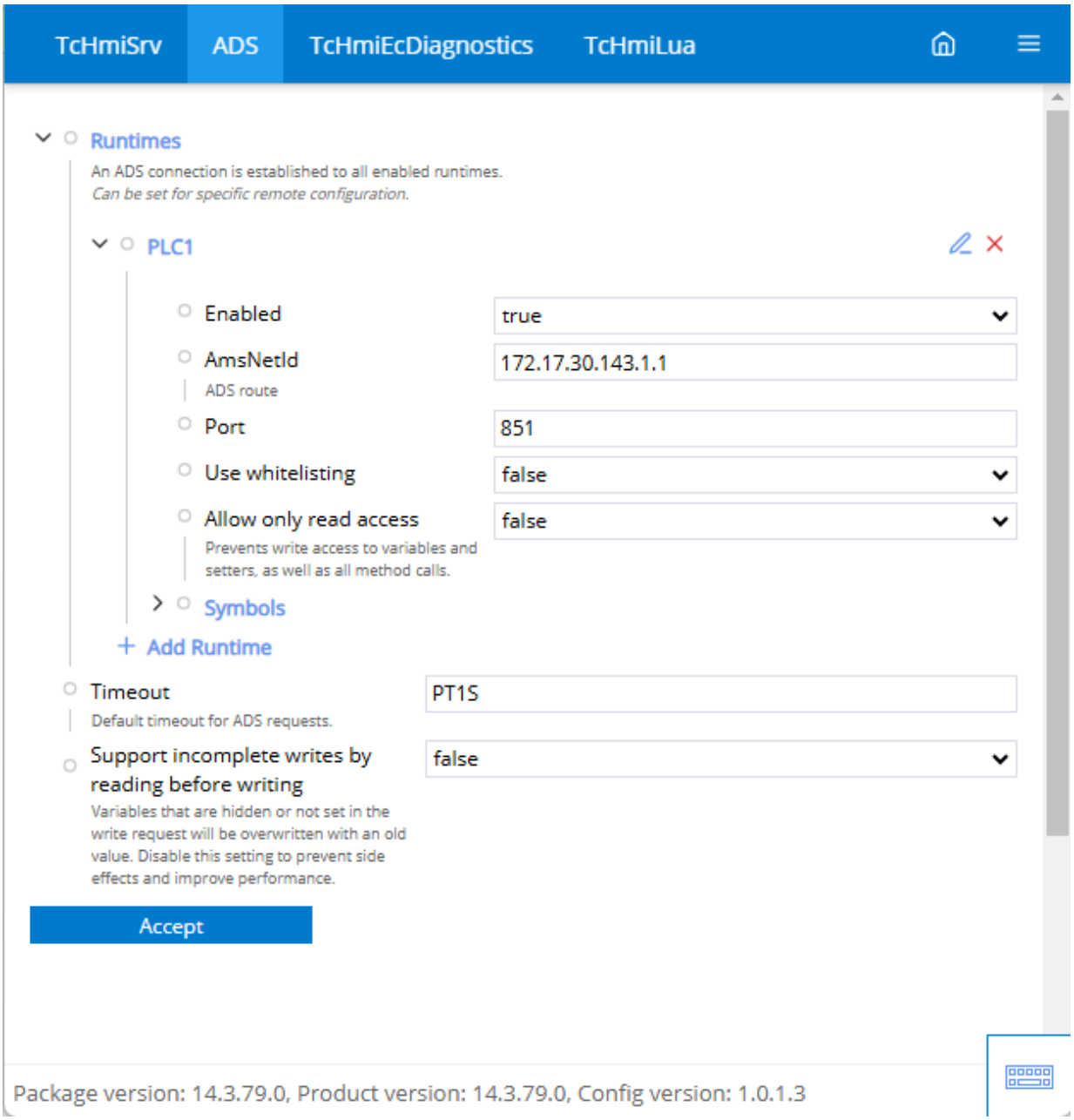
Installation

Installation is not necessary. This package is an integral part of the HMI Server.

Configuration of the ADS extension

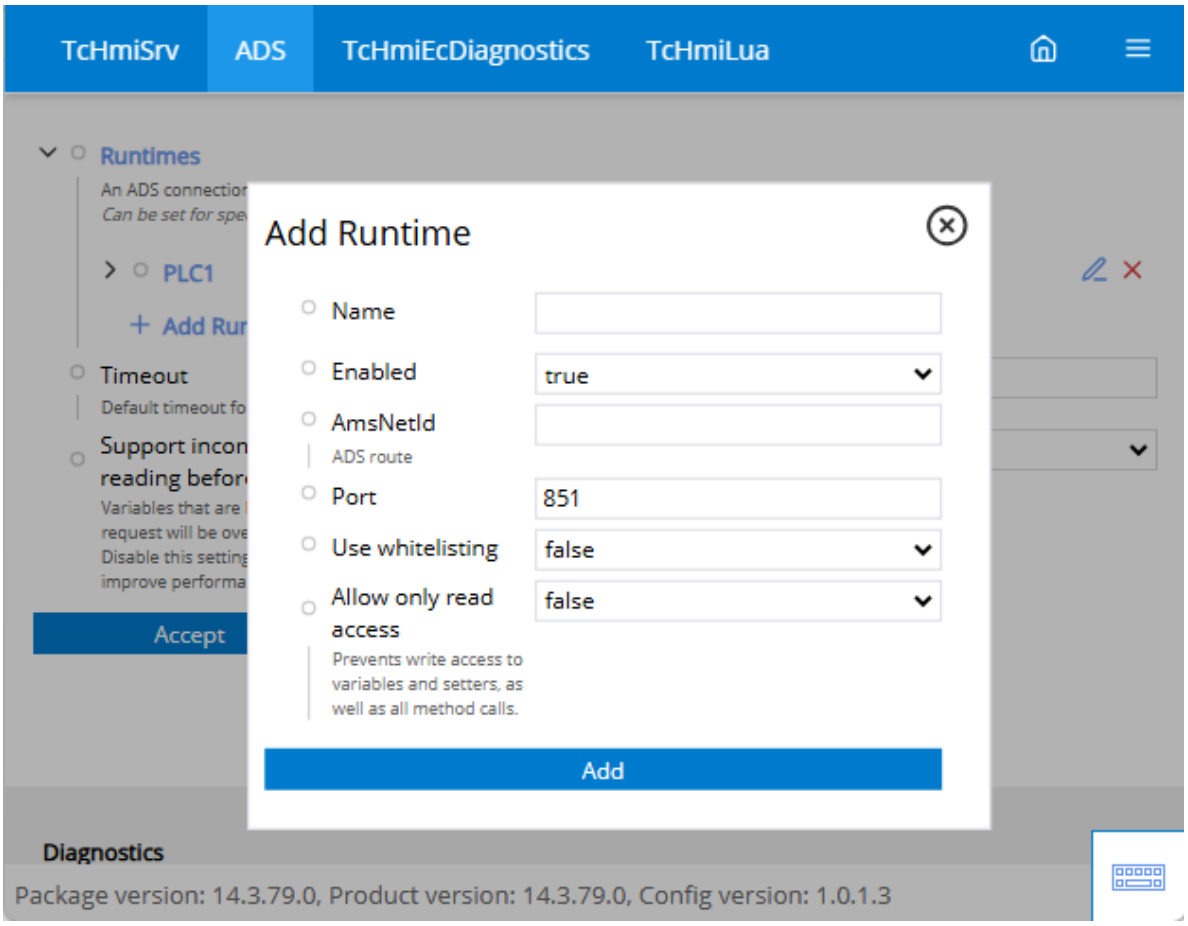
1. Open the server configuration page.

2. Go to the **ADS tab.**



3. Click on **Runtimes** to open the submenu.
   ⇨ An entry with **PLC1** is already set up by default.
4. Adjust the **PLC1** entry or click on **Add runtime**

⇨ When adding, a pop-up opens for further settings.



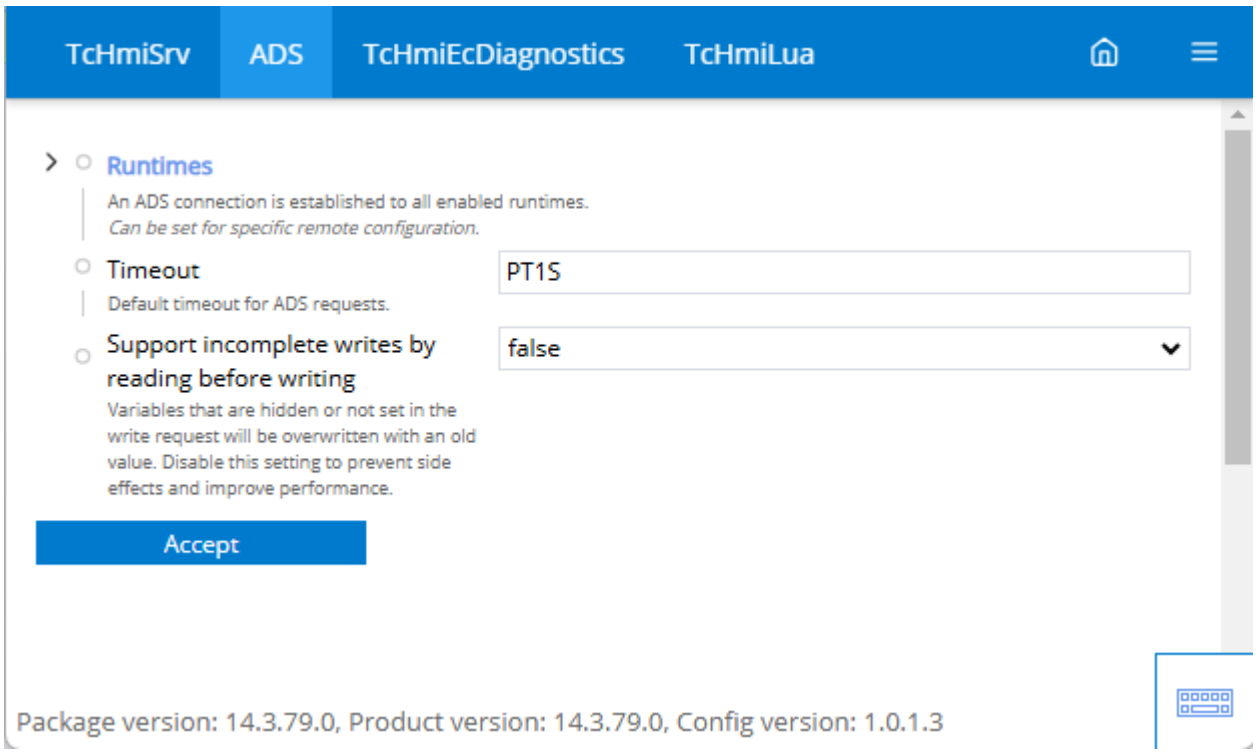
5. Define the name of the runtime under:
   Name:. (Used as namespace for the symbols).
   Active: Activate or deactivate the connection to the specified target system.
   AmsNetId: The AmsNetId of the target system to which a connection is to be established.
   Port: The Port for the ADS connection.
   Use Whitelisting: If Whitelisting should be used. Variables in the PLC are only found if the corresponding attributes [▶ 39] have been set on the PLC variable.
   Allow only read access: Block write access to the system.

⇨ The connection you have configured is now available. The new symbols can now be read via the server. To do this, you can map directly via the server or the configuration window within Visual Studio.

4.3.2 Configuration

General

The basic settings for the Server extension are specified in the **General** tab.



Runtimes [▶ 37]

- Establish a connection to a device via ADS.

Timeout

- Specifies how long an attempt is made to establish a connection or a read request is performed before a timeout occurs.

Support incomplete writing operations by reading before writing

- Was required for older TwinCAT versions < 4024.17. With newer TwinCAT versions, disabling can lead to better performance.

Maximum timeout for runtime status determination (Advanced settings)

- A configured runtime is considered unavailable if a request takes longer than this period of time.

Interval of runtime status determination (advanced settings)

- The status of each configured runtime is checked at regular intervals.

Ignored PLC attributes (advanced settings)

- Attribute pragmas are added to the JSON schema. The attributes configured here are hidden.

Visible runtime ports (advanced settings)

- Target systems can have many ADS ports. Most of them are rarely used in HMI projects.

Limiting the response size of ADS requests (Advanced settings)

- The PLC task is blocked for each request. If the request is too large, the PLC cycle time may be exceeded.

Limitation of the number of ADS requests that can be bundled in a sum request (Advanced settings)

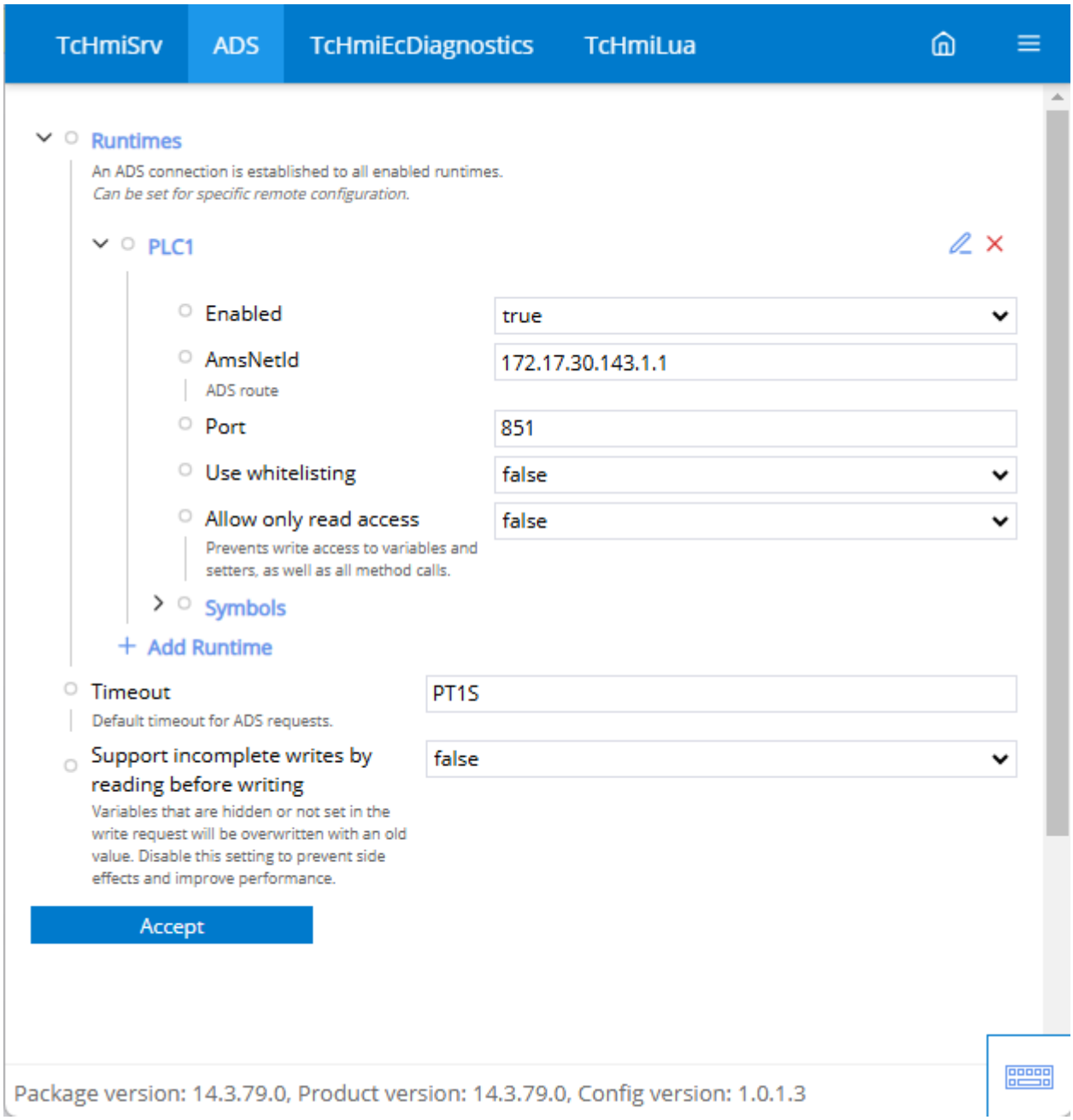
- The PLC task is blocked for each request. If a sum request contains too many requests, the PLC cycle time may be exceeded.

Limiting the number of ADS handles created with a sum request (Advanced settings)

- The TwinCAT handle buffer is not increased during a sum request. Creating too many ADS handles in a single sum request leads to errors if the TwinCAT handle buffer is full.

4.3.2.1 Runtimes

Establish a connection via ADS to another process.



Enabled

- Enable or disable the connection to the set AMS Net Id.

AmsNetId

- AMS Net Id to which a connection is to be established.

Port

- Specifies the port for the ADS connection.

Use whitelisting

- Indicates whether whitelisting is used. Variables in the PLC are only found if the corresponding attributes [▶ 39] have been set on the PLC variable.

Allow only read access

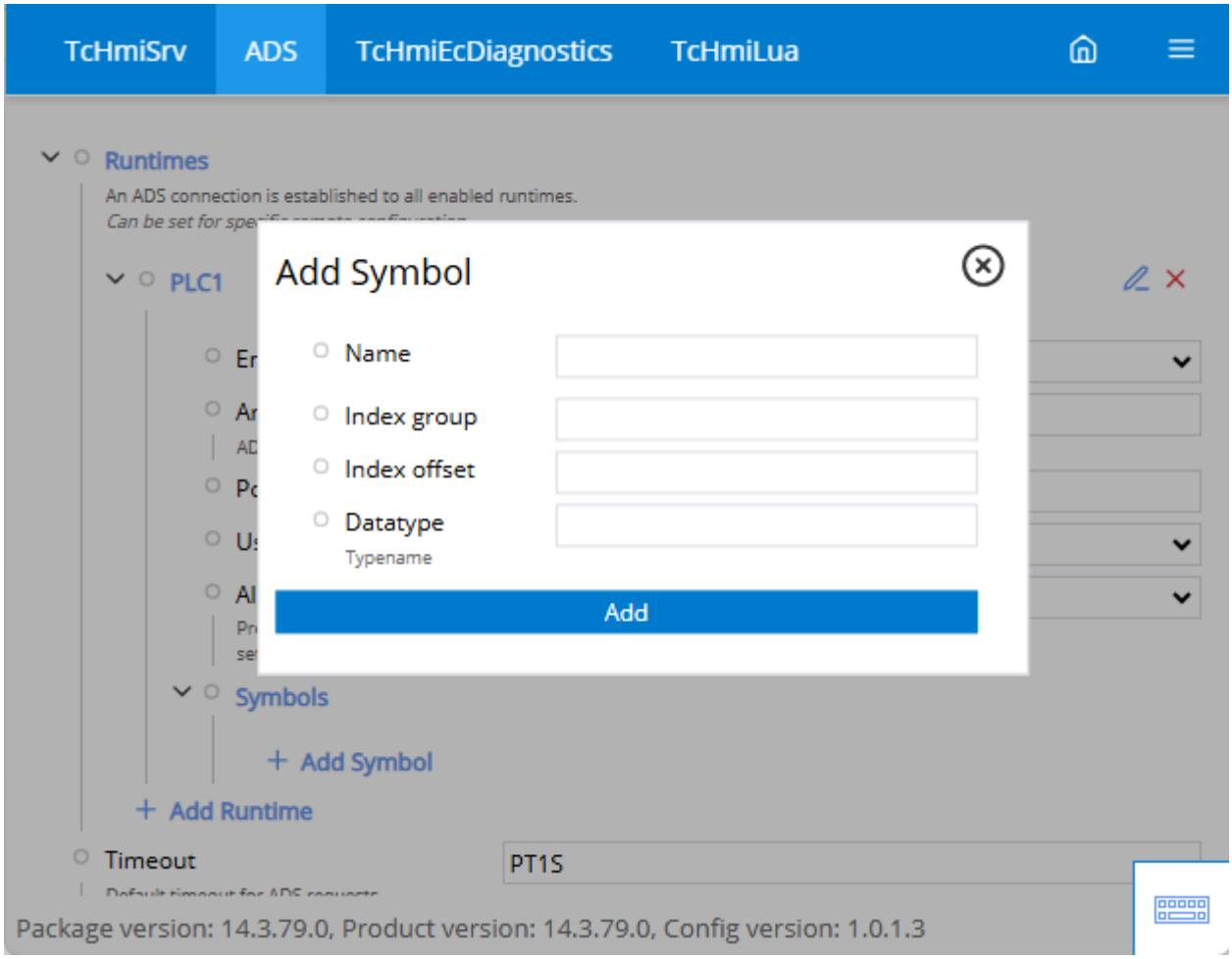
- Indicates whether only reading via ADS is possible.

Symbols [▶ 38]

- Provides variables without symbol names. These are addressed via the Index group and the Index offset.

4.3.2.1.1 Access by IndexGroup and Offset

It makes most sense to access PLC variables by symbol name in order to detect changes in the symbolism (e.g. due to an OnlineChange). Small controllers (e.g. BC/BX) that have no symbolism can be addressed directly via Index group and offset. Via the configured ADS runtime you can add a new symbol that fetches the values by Index group and offset (hex values are converted to the corresponding decimal values).



Name

- Name of the new symbol.

Index group

- Index group of the data which should be read.

Index offset

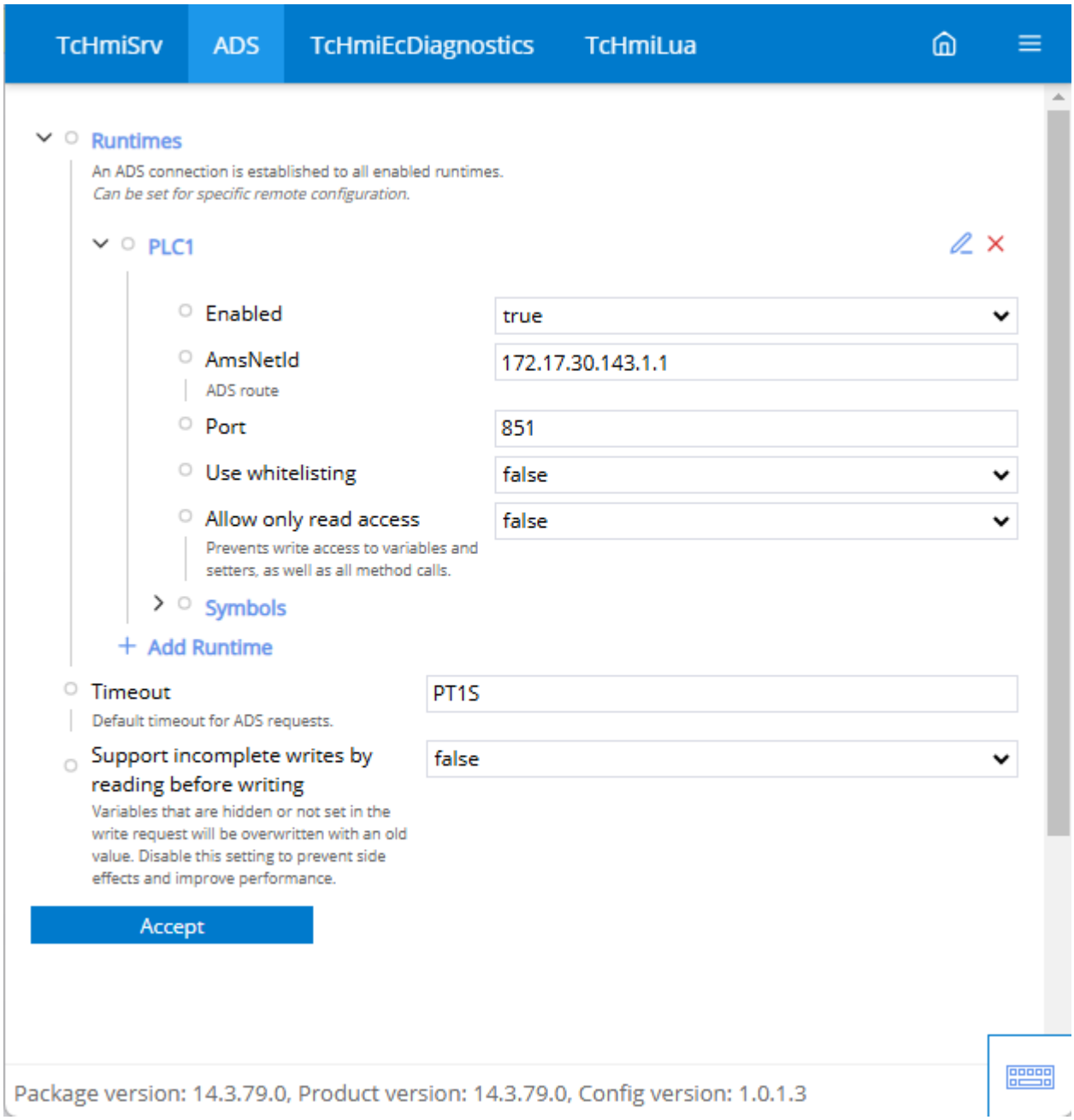
- Index offset of the data which should be read.

Data type

- Data type of the new symbol.

4.3.2.2 Blacklisting and whitelisting

With version 1.12, it is possible to use black or whitelisting for PLC symbols. With black or whitelisting, PLC symbols can be explicitly hidden or shown for use in the HMI. For this, you can tag the corresponding variables in the PLC with an attribute pragma. In the default case, blacklisting is active, which means that you have access to all variables of the PLC that are not explicitly hidden for the HMI. On the configuration page of the ADS extension, you can switch between black and whitelisting (**Use whitelisting**).



The following attribute pragmas are available for black or whitelisting in the TwinCAT HMI:

```
{ attribute 'TcHmiSymbol.Show' }
{ attribute 'TcHmiSymbol.ShowRecursively' }
{ attribute 'TcHmiSymbol.Hide' }
{ attribute 'TcHmiSymbol.ReadOnly' }
{ attribute 'TcHmiSymbol.BLOB' }
```

Use:

- TcHmiSymbol.Show: If a variable has this attribute, it will be displayed in the HMI in case of whitelisting. With this attribute only the first level is displayed (example: only the struct, but not the sub-elements). The attribute has no effect on blacklisting.

- TcHmiSymbol.ShowRecursively: If a variable has this attribute, it is displayed with all sub-elements in the HMI in the case of whitelisting (e.g. structure or function block with all sub-elements). Variables in the sub-elements that are blacklisted with *TcHmiSymbol.Hide* are not displayed.
- TcHmiSymbol.Hide: If a variable has this attribute, it will not be displayed in the HMI in case of blacklisting. All variables without an attribute are displayed. If the attribute is used with a structure, all sub-elements are also hidden in the HMI, even if they are tagged with *TcHmiSymbol.Show*.
- TcHmiSymbol.ReadOnly: If a variable has this attribute, the variable with all sub-elements cannot be written in the HMI.
- TcHmiSymbol.BLOB: If a variable has this attribute, the data is transferred to the server and the client in binary form (reduction of packet size). The data must be converted in the client itself.

Blacklisting overrides whitelisting.

With blacklisting, all variables are visible in the HMI, except variables with the attribute *TcHmiSymbol.Hide*.

With whitelisting, no variables are visible in the HMI except variables with the attributes *TcHmiSymbol.Show* and *TcHmiSymbol.ShowRecursively*.

Available since version 1.12.

4.3.2.3 Methods and properties

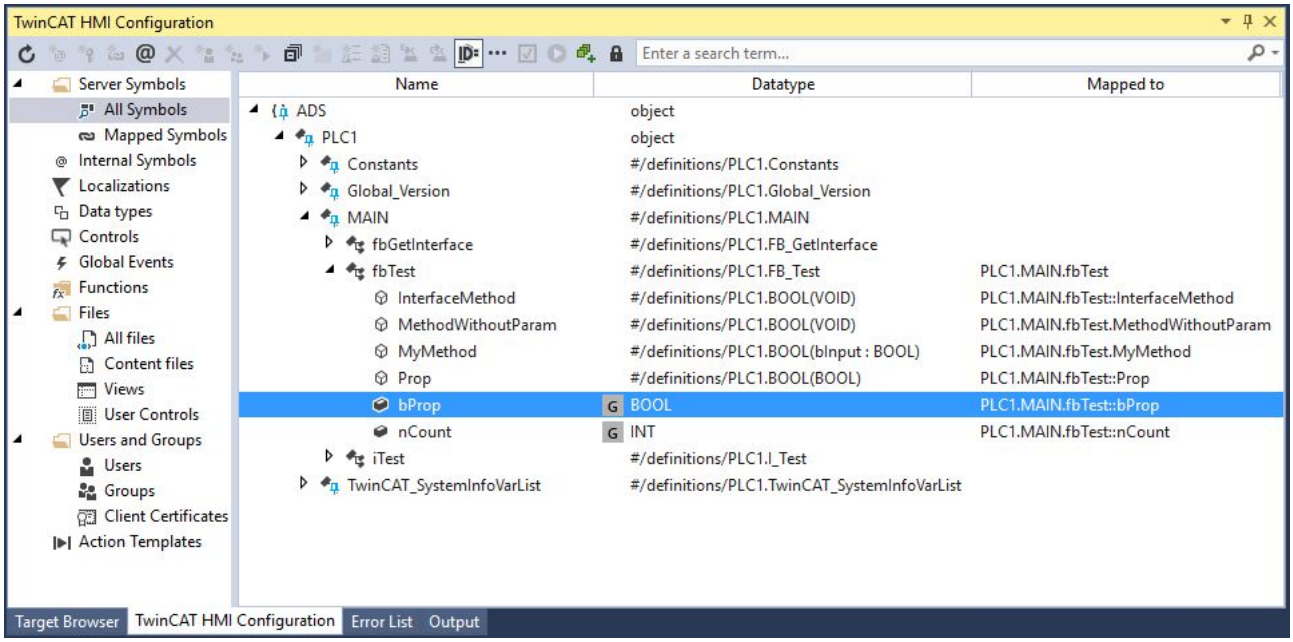
With version 1.12 it is possible to access PLC properties in the HMI and to call PLC methods in the HMI.

PLC properties

The properties must be made visible in the PLC with an attribute pragma via ADS.

```
{attribute 'monitoring' := 'call'}
PROPERTY Prop : BOOL
```

You can then access the property in the TwinCAT HMI.



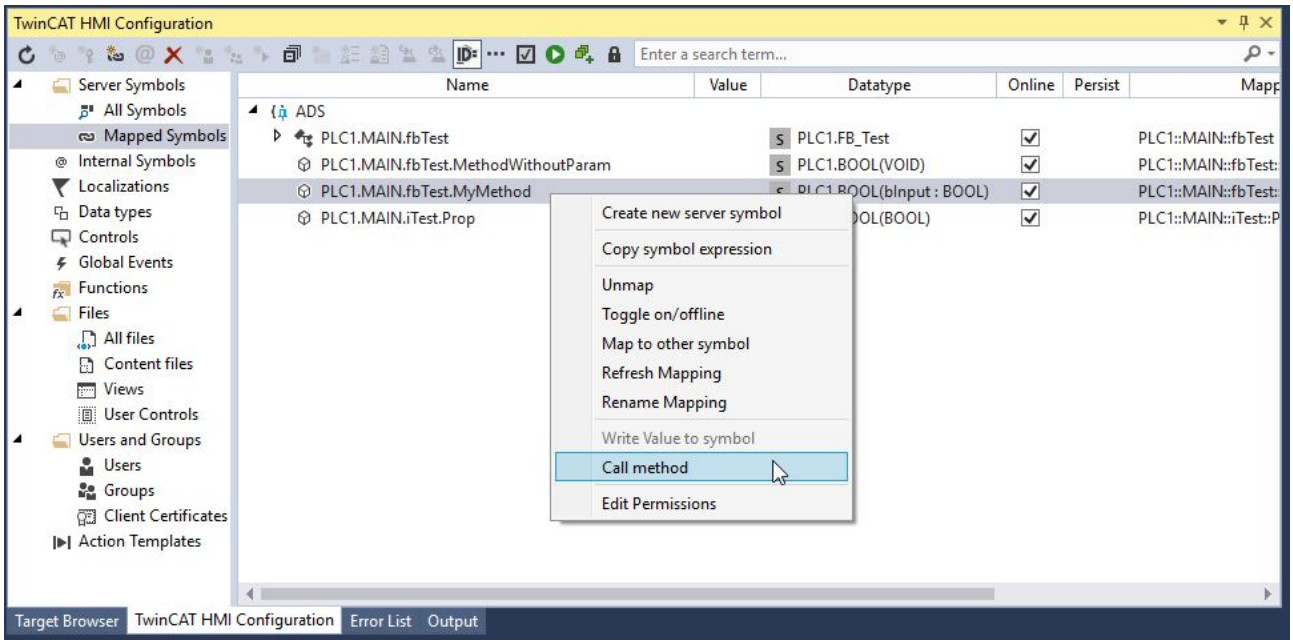
PLC properties can only be used explicitly in the HMI by linking the property individually to a control attribute. If the entire function block is linked to a control attribute, the property is not called. This is the case when a function block is used as the source data of the DataGrid or as a user control parameter.

PLC methods

The methods must be switched visible in the PLC with an attribute pragma via ADS.

```
{attribute 'TcRpcEnable'}
METHOD MyMethod : BOOL
VAR_INPUT
bInput : BOOL;
END_VAR
```

Afterwards you can see the methods in the TwinCAT HMI. Within the TwinCAT HMI Configuration Window, you can call them explicitly.



At runtime in the client, you can call the methods using a JavaScript/TypeScript function and the Framework API. Below you will find an example for the call via Framework API.

```
// call of method without parameter
TcHmi.Symbol.readEx2("%s%PLC1.MAIN.fbTest.MethodWithoutParam%/s%", function (data) {
console.log(data);
});

// call of method with parameter
TcHmi.Symbol.writeEx("%s%PLC1.MAIN.fbTest.MyMethod%/s%", { bInput: true }, function (data) {
console.log(data);
});
```

If the method has a return value, you can access the return value within the callback function in the Result object.



In a future version of the TwinCAT HMI, it will be possible to call the methods directly via the Actions and Conditions Editor without using JavaScript/TypeScript.

Methods must always be called explicitly and cannot be used as a control attribute. Note that calling a method from the HMI results in the execution of PLC code.

Available from version 1.12.

4.3.2.4 Pointers and references

User-defined structures with references and pointers as member variables can be read and written using dereferencing if the PLC data type has been marked with the PLC attribute TcGenerateDeRefType.

Available starting with HMI Server version 14.3.76 and TwinCAT version 4026.20

With version 1.12.748.0, references, pointers, and interface pointers can be resolved in the HMI. This makes it possible to access the original variable being pointed to via the pointer or reference. It can be read and written when accessed via the pointer or reference. The resolved pointers or references are listed as usual under the variables in the TwinCAT HMI Configuration Window.

Changing the addresses of the pointers or references so that they point to another variable is not possible in the HMI. This must be done in the PLC.

Available since version 1.12.748.0.

4.3.3 ADS Server Interface

The HMI Server's ADS Server

When the HMI server is started as a service, the service manager opens an ADS server on port 19800. This ADS server can be used to discover and get the state of HMI server instances that are managed by the service manager.

Index groups and index offsets

> **Read-Write requests**
>
> The "RW" value in the "Access" column indicates that only Read-Write requests are supported for this index group index offset combination. All index offsets of the `INDEXGROUP_SERVERSTATES` index group expect the name of the managed server instance as a write-value. It is analogous to a function parameter.

The following table contains all supported index groups:

Index Group	Name	Description	Remarks
0x00000001	INDEXGROUP_SERVERSTATES	Contains index offsets for the state of the managed server instances.	
0x00000002	INDEXGROUP_INSTANCES	Contains index offsets that provide access to the names of the managed server instances.	

The following table contains all supported index offsets for the `INDEXGROUP_SERVERSTATES` index group:

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000001	0x00000001	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_JSON	The full state of a specific managed server instance as a JSON object.
0x0000001	0x00000002	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_ARCHITECTURE	The name of the architecture that a specific managed server instance is running on.
0x00000001	0x00000003	RW	W: STRING R: BOOL	INDEXOFFSET_SERVERSTATE_CREATOR_MODE	True if the managed server instance is an engineering server (started with "--creator").
0x00000001	0x00000004	RW	W: STRING R: UINT64	INDEXOFFSET_SERVERSTATE_PID	The process ID of a specific managed server instance.
0x00000001	0x00000005	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SERVERSTATE_PRODUCT_VERSION	The product version of a specific managed server instance.
0x00000001	0x00000006	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_PROJECT_NAME	The configured project name of a specific managed server instance.
0x00000001	0x00000007	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SERVERSTATE_PROJECT_VERSION	The configured project version of a specific managed server instance.
0x00000001	0x00000008	RW	W: STRING R: BOOL	INDEXOFFSET_SERVERSTATE_PUBLISH_IN_PROGRESS	True if a project is being published onto the specified managed server instance.
0x00000001	0x00000009	RW	W: STRING R: BOOL	INDEXOFFSET_SERVERSTATE_SERVICE_MODE	Always true, because all managed server instances are started by the service manager.

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000001	0x0000000A	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_SERVICE_NAME	The unique instance name of a specific managed server instance. This is pretty useless because you need to know it to request it.
0x00000001	0x0000000B	RW	W: STRING R: INT32	INDEXOFFSET_SERVERSTATE_STATE	The running state of a specific managed server instance.
0x00000001	0x0000000C	RW	W: STRING R: HMIVERSION	INDEXOFFSET_SERVERSTATE_VERSION	The version of a specific managed server instance.
0x00000001	0x0000000D	RW	W: STRING R: UINT8[n]	INDEXOFFSET_SERVERSTATE_ENDPOINTS	The number of returned strings as a UINT32, followed by all configured endpoints of a specific managed server instance concatenated, each separated by a 0x00 byte.
0x00000001	0x0000000E	RW	W: STRING R: UINT8[n]	INDEXOFFSET_SERVERSTATE_FORCEAUTHENDPOINTS	The forced authentication endpoints of a specific managed server instance.
0x00000001	0x0000000F	RW	W: STRING R: STRING	INDEXOFFSET_SERVERSTATE_SERVERTIME	The current ISO-8601 timestamp of a specific managed server instance.
0x00000001	0x0000001F	RW	W: STRING R: INT64	INDEXOFFSET_SERVERSTATE_SERVERTIME_NS	The current timestamp of a specific managed server instance in nanoseconds since the Unix epoch.

The following table contains all supported index offsets for the `INDEXGROUP_INSTANCES` index group:

Index Group	Index Offset	Access	Data Type	Offset Name	Description
0x00000002	0x00000001	R	STRING	INDEXOFFSET_INSTANCE_NAMES_JSON	The names of the managed server instances as a JSON array of strings.
0x00000002	0x00000002	R	UINT8[n]	INDEXOFFSET_INSTANCE_NAMES	The number of returned strings as a UINT32, followed by the names of the managed server instances concatenated, each separated by a 0x00 byte.

The HMIVERSION type

Normally, ADS uses three-part version numbers consisting of a major version, a revision number and a build number. The TwinCAT HMI uses four-part version numbers instead. To solve this problem, the `HMIVERSION` type was introduced. It is returned by requests to the following index group index offset combinations:

- `INDEXGROUP_SERVERSTATES:INDEXOFFSET_SERVERSTATE_PRODUCT_VERSION`

- INDEXGROUP_SERVERSTATES:INDEXOFFSET_SERVERSTATE_VERSION
- INDEXGROUP_SERVERSTATES:INDEXOFFSET_SERVERSTATE_PRODUCT_VERSION
- INDEXGROUP_SERVERSTATES:INDEXOFFSET_SERVERSTATE_PROJECT_VERSION

Type definition in Structured Text (ST):

```
TYPE HMIVERSION  :STRUCT    one   : UDINT;
    two   : UDINT;
    three : UDINT;
    four  : UDINT;
END_STRUCTEND_TYPE
```

Type definition in C:

```
struct HMIVERSION
{
    uint32_t one;
    uint32_t two;
    uint32_t three;
uint32_t four;
};
```

xample of the JSON object returned by INDEXGROUP_SERVERSTATES:INDEXOFFSET_SERVERSTATE_JSON

```
{
   "architecture": "win-x64",
   "creatorMode": false,
   "endpoints": ["http://127.0.0.1:59150"],
   "forceAuthEndpoints": [],
   "pid": 31756,
   "productVersion": "0.0.0.0",
   "projectName": "",
   "projectVersion": "",
   "publishInProgress": false,
   "serviceMode": true,
   "serviceName": "ServerInstanceOne",
"state": 1,
"version": "0.0.0.0"
}
```

xample of the JSON array returned by INDEXGROUP_INSTANCES:INDEXOFFSET_INSTANCE_NAMES_JSON

```
["ServerInstanceOne", "ServerInstanceTwo"]
```

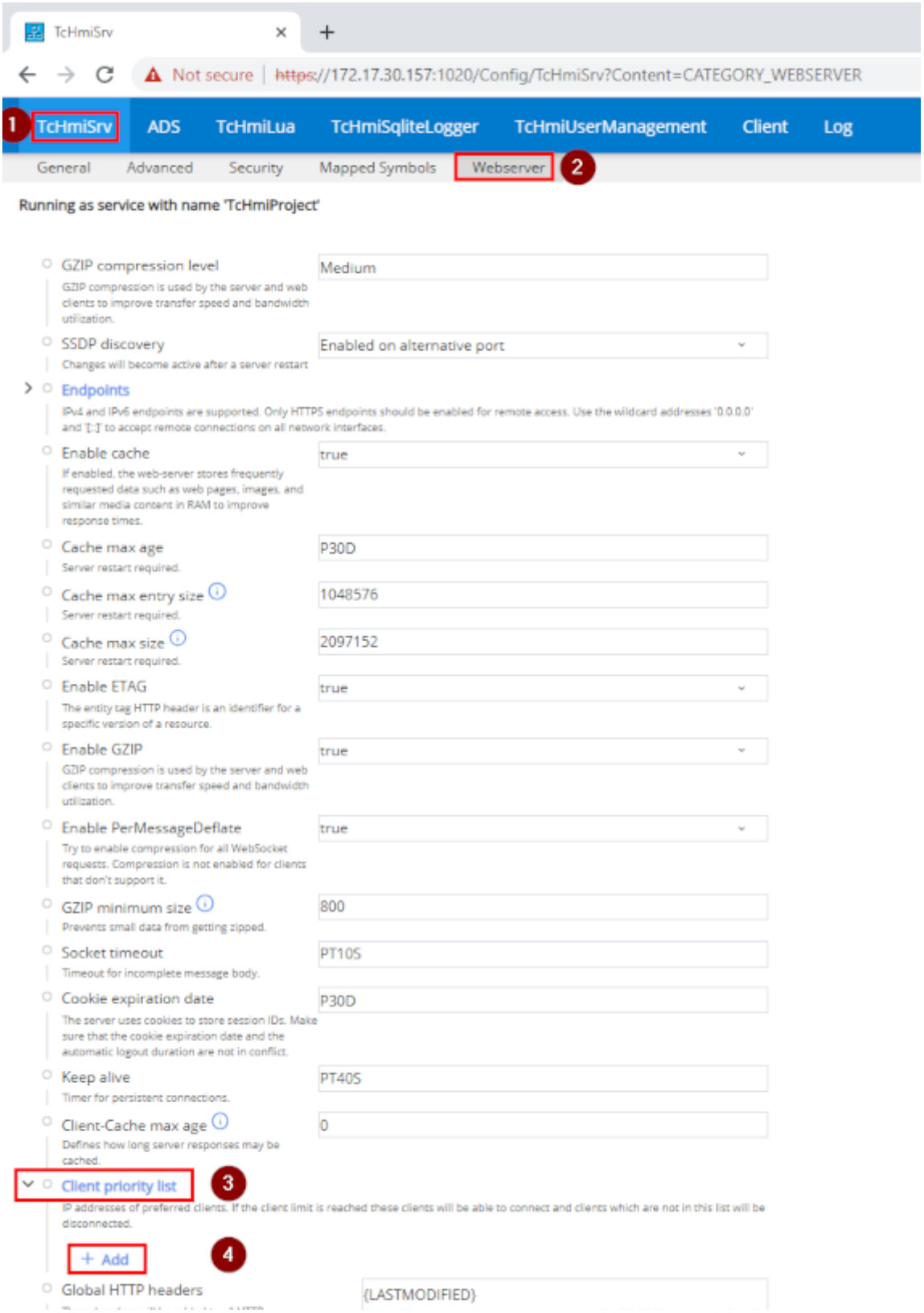
4.4 TcHmiSrv

4.4.1 Client prioritization

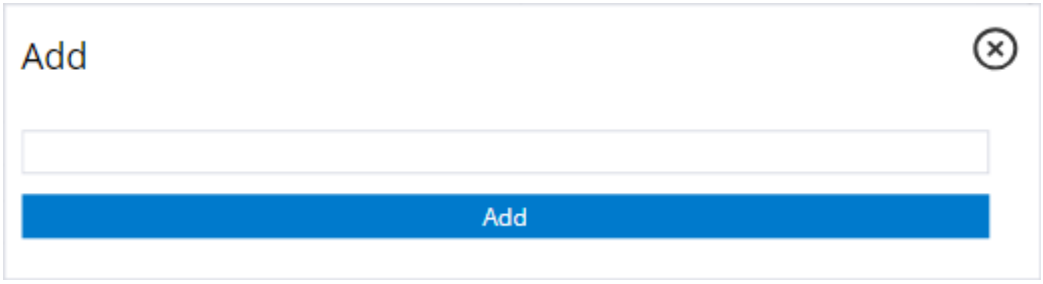
To define an access sequence for the clients, the TwinCAT 3 HMI server offers the option of setting a prioritization. This ensures that the connection to a low-order client is closed and the high-order client can log in. The configuration takes place in the settings of the TwinCAT 3 HMI server. The local client always has priority. If two clients from the priority list are affected, the order of the entries is checked.

1. Open **TcHmiSvr**.
2. Select the **Web server** tab.
3. Select the **Client priority list** entry

4. Click on **Add**

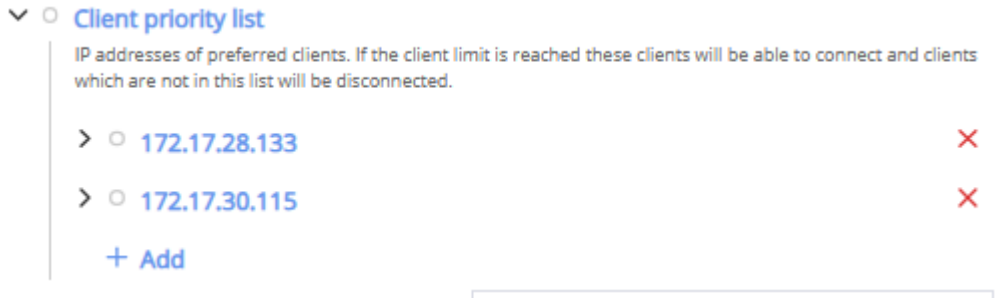


⇨ The following dialog opens.

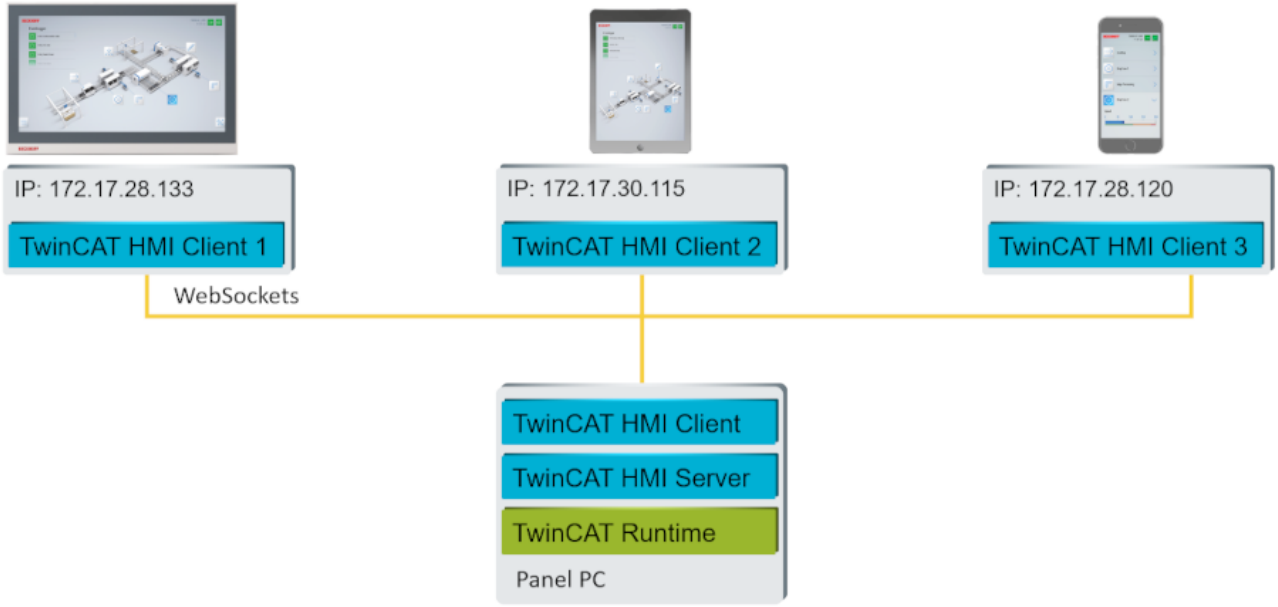


5. Enter the IP address of the preferred client.

⇨ The registered IP addresses are entered one below the other in a list.

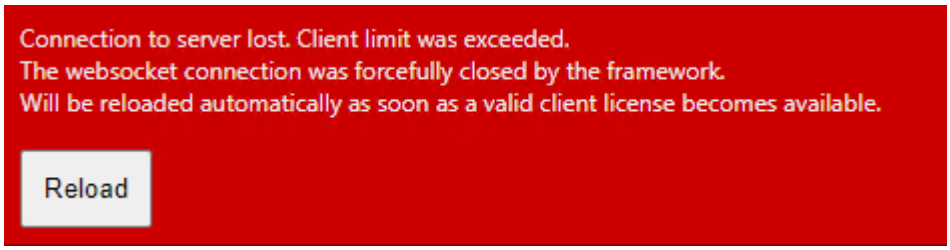


Example:



A total of four client licenses are required (TF2000 + TF2020) so that all four clients can access the server at the same time. If you only have three licenses available, for example, this means that a client cannot establish a connection to the server. To ensure that certain clients can always establish a connection, they must be entered in the client priority list. According to this figure and the previous priority list, Client 3 can log in if a free license is available. If the other three clients log in, they would kick Client 3 out of its session.

Error message on the logged off client:

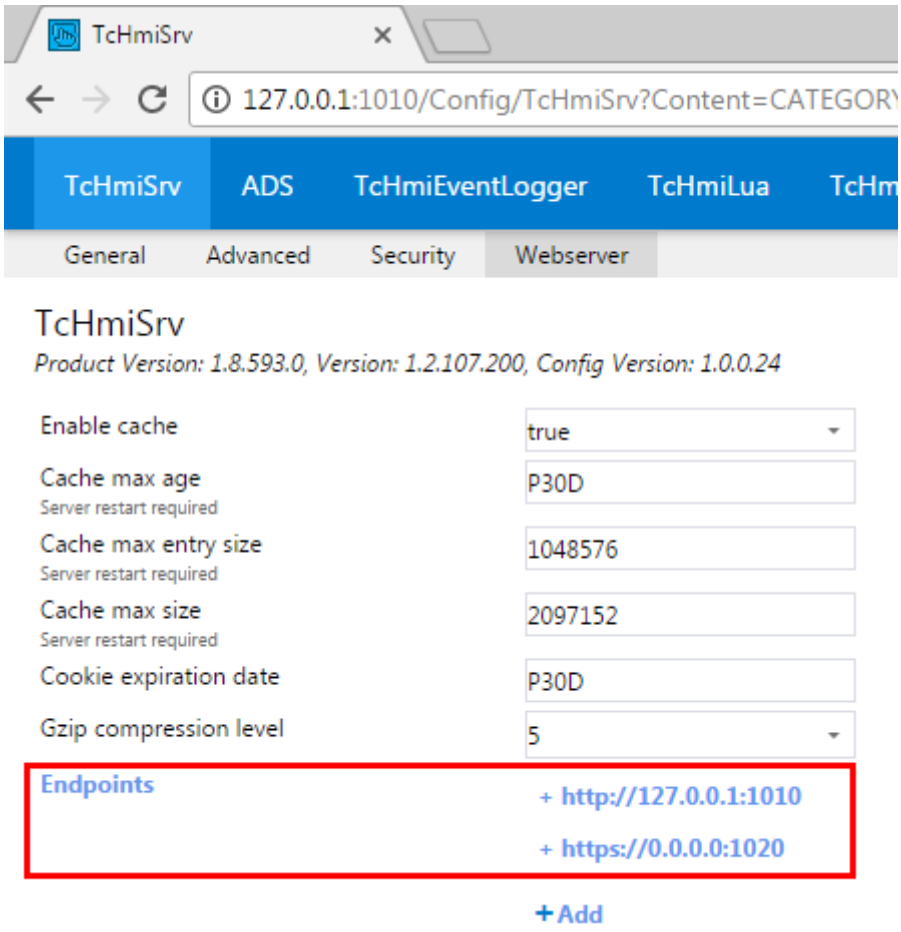


Available from version 1.12.748.0

4.4.2 Configuring the network interface card

Under *TcHmiSrv/Webserver/Endpoints* you can configure under which network interface cards, port numbers and protocols the HMI server can be reached.

- Protocols supported: HTTP/HTTPS
- Binding to all network interface cards:
  Static IP address of a network card: Binding to associated cards.
  127.0.0.1: Only local access is allowed, remote connections are rejected.
- Port number: Freely selectable, should not already be accessed by the operating system.

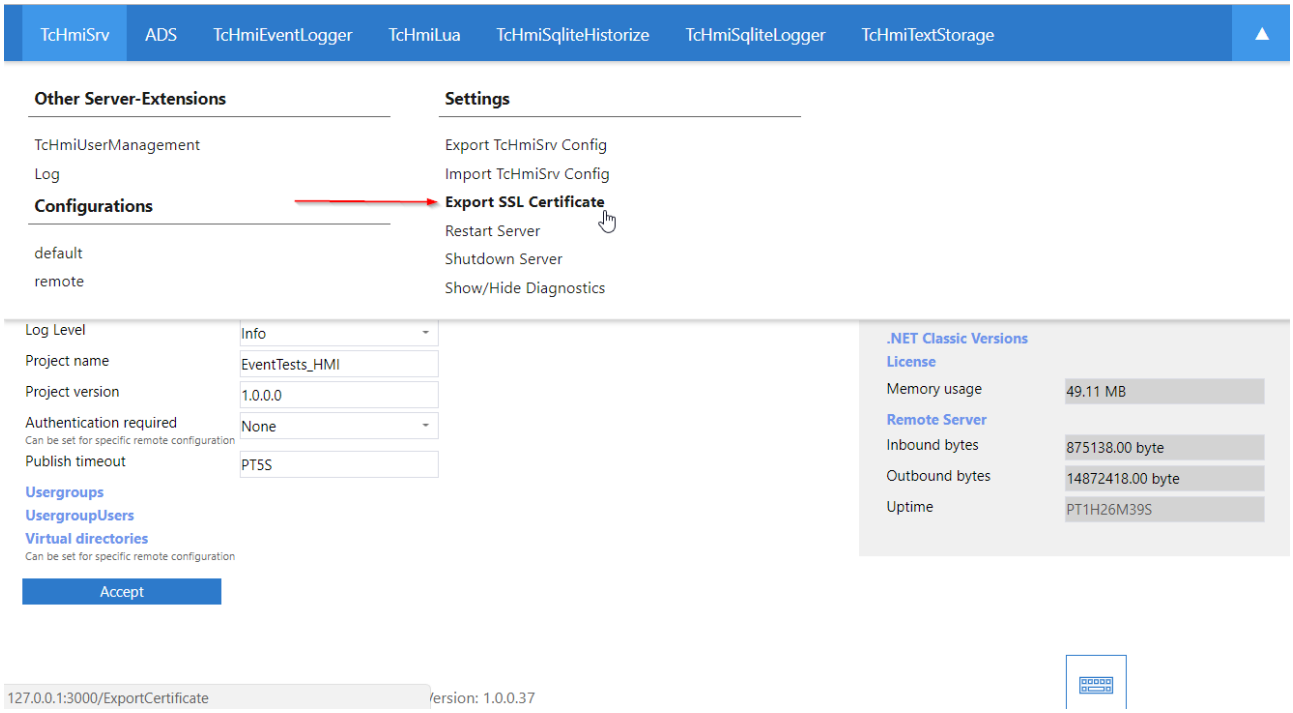


4.4.3 Configuring certificates

The TwinCAT HMI server offers the option of issuing certificates for a secure connection.

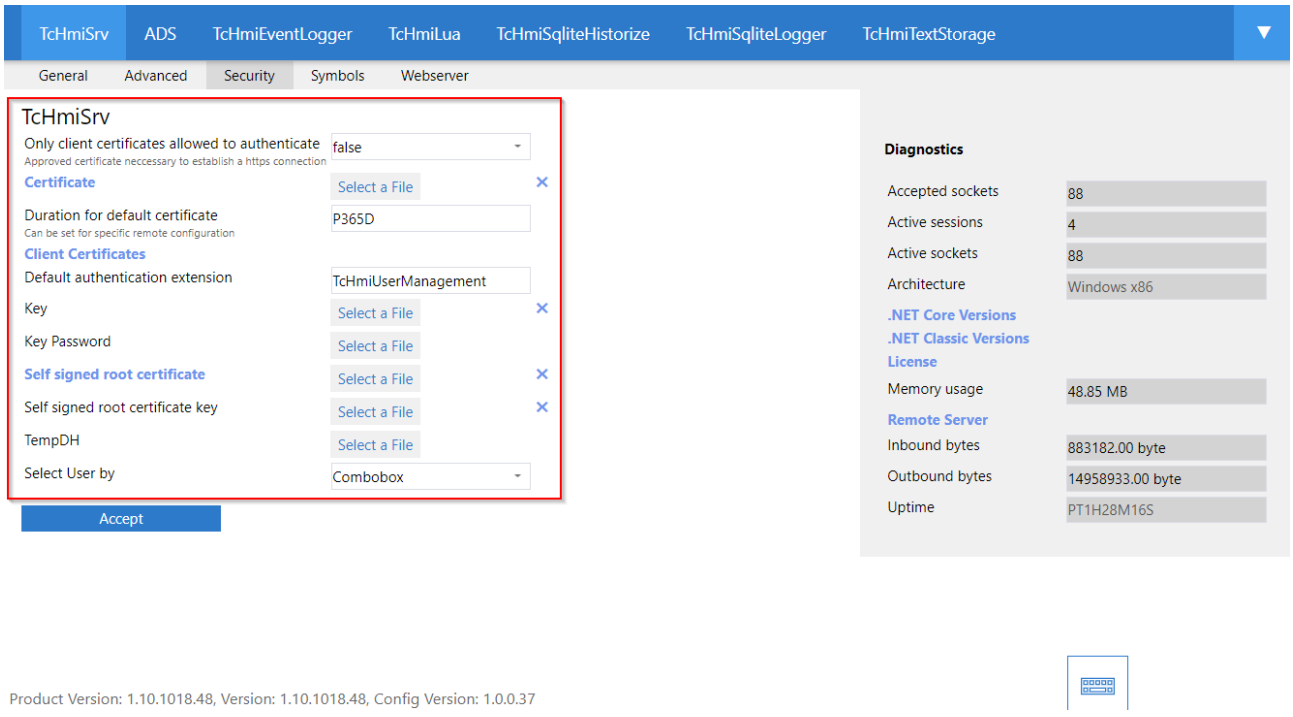
Exporting a certificate for clients:

To verify the certificates, install them on the respective clients.



Integrating the issued certificate:

If an officially issued certificate is available, you can upload it on the configuration page of the server under TcHmiSrv/Security/Certificate (.crt). Save the private key in PEM format.



The certificate is also used to restrict access. Only connections to the HMI server via one of the IP addresses or the host name defined in the certificate are permitted. If you would like to allow other addresses as well, enter them under Allowed Origins [▶ 50] or recreate the certificate with the appropriate entries.

4.4.3.1 Uploading a new certificate

A new certificate can be sent to the HMI via WebSocket. To do this, encode the new certificate in Base64 and send it to the corresponding symbol.

Example of uploading a certificate from an HTML host control:

In this example, a certificate can be selected using the input field. This will be opened and its contents encoded using Base64. Then, the encoded string is sent to the corresponding certificate symbol on the server, where it overwrites the old one.

```
<div id="TcHmiHtmlHost_1" data-tchmi-type="TcHmi.Controls.System.TcHmiHtmlHost" data-tchmi-
height="300"
    data-tchmi-height-unit="px" data-tchmi-left="20" data-tchmi-left-unit="px" data-tchmi-top="87"
    data-tchmi-top-unit="px" data-tchmi-width="300" data-tchmi-width-unit="px">
    <input type="file" class="inputNewCertificate" accept=".pem, .pfx, .cer, .crt">
    <script>
        const fileInput = document.querySelector('.inputNewCertificate');

        fileInput.addEventListener('change', () => {
            // Stop early if the user did not select a file.
            if (!fileInput.files || fileInput.files.length === 0) {
                console.log('No file was selected.');
                return;
            }

            // Read the selected file as plain text.
            const selectedFile = fileInput.files[0];
            const reader = new FileReader();
            reader.onload = () => {
                // The file content is available in reader.result once loading is complete.
                const fileContent = String(reader.result ?? '');

                // Convert the text content to Base64 before writing it to the PLC symbol.
                const base64Content = btoa(fileContent);

                TcHmi.Symbol.writeEx('%s%TcHmiSrv.Config::CERTIFICATE%/
s%', base64Content, function (data) {
                    if (data.error === TcHmi.Errors.NONE) {
                        // Successfully wrote the Base64 certificate content.
                    } else {
                        // Writing failed. Inspect the error details in the callback data.
                    }
                });
            };

            reader.onerror = () => {
                // FileReader failed to read the selected file.
                console.error('The selected file could not be read.');
            };

            reader.readAsText(selectedFile);
        });
    </script>
</div>
```

4.4.4 Allowed Origins

Under “Allowed Origins,” you can specify additional host names or IP addresses from which connections to the server are permitted. By default, the server accepts only the IP addresses and host names specified in the certificate being used. Other systems that are allowed to access the server can be specified as regular expressions (RegEx).

Examples:

IP address 172.12.123.1 on port 2020

```
^https://172\.12\.123\.1:2020$
```

Host name myserver on port 2020

```
^https://myserver:2020$
```

Host name myserver on port 8080

```
^https://myserver:8080$
```

Allow all origins

```
.*
```

⚠ WARNING

Allowing general access

You can allow all requests using ".*". This is a significant security vulnerability and should be used exclusively for testing and development purposes. This setting is expressly not recommended for production systems.

To access a server over the network, at least one of the following requirements must be met:

- The IP address or host name used is listed in the certificate.
- The IP address or host name used is configured under "Allowed Origins".

If these requirements are not met, access can alternatively be gained via an SSH tunnel. This is helpful, for example, on a Linux® system without a connected monitor.

1. To do this, open PowerShell.
2. Run the following command, replacing <Host-IP-or-Host name> with the IP address or hostname of the external device.
   ```
   ssh -N -L 2020:localhost:2020 Administrator@<Host-Ip-or-Hostname>
   ```
3. Open a local browser.
4. You can now access your external server using the following URL
   ```
   https://127.0.0.1:2020/Config
   ```
5. Navigate to TcHmiSrv/Security
6. Adjust the "Allowed Origins" entry accordingly to allow future connections even without an SSH tunnel.

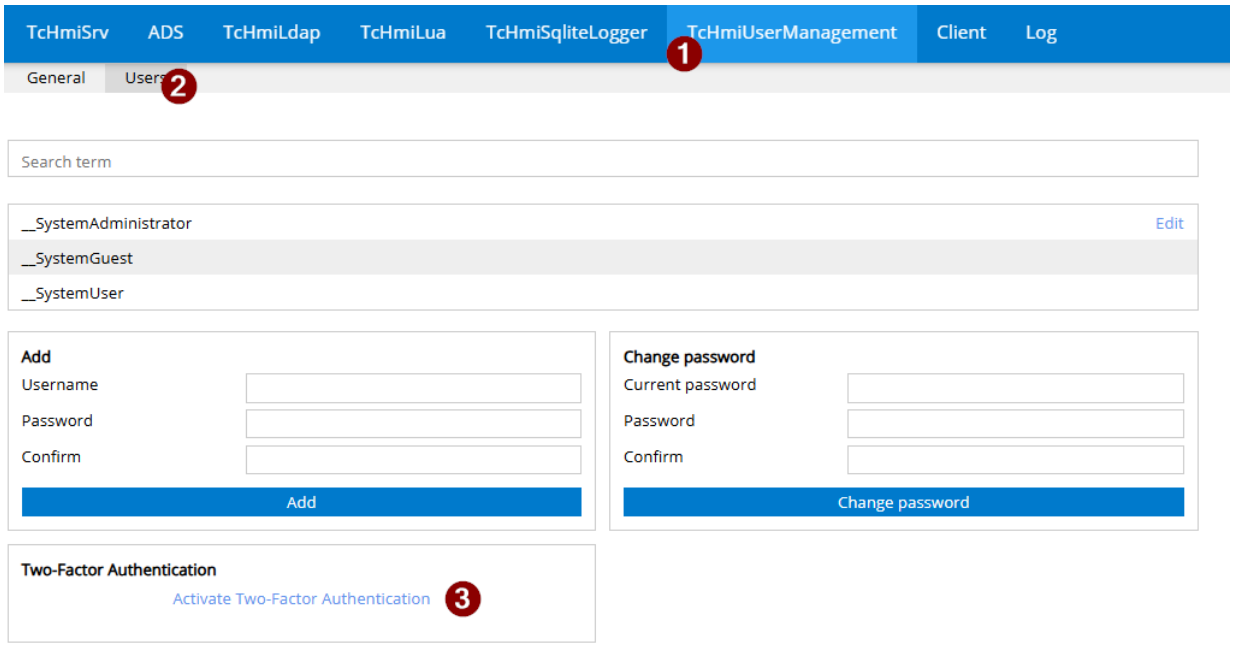
⇨ After saving, you can access the server directly using the newly configured IP address or host name.

4.5 TcHmiUserManagement

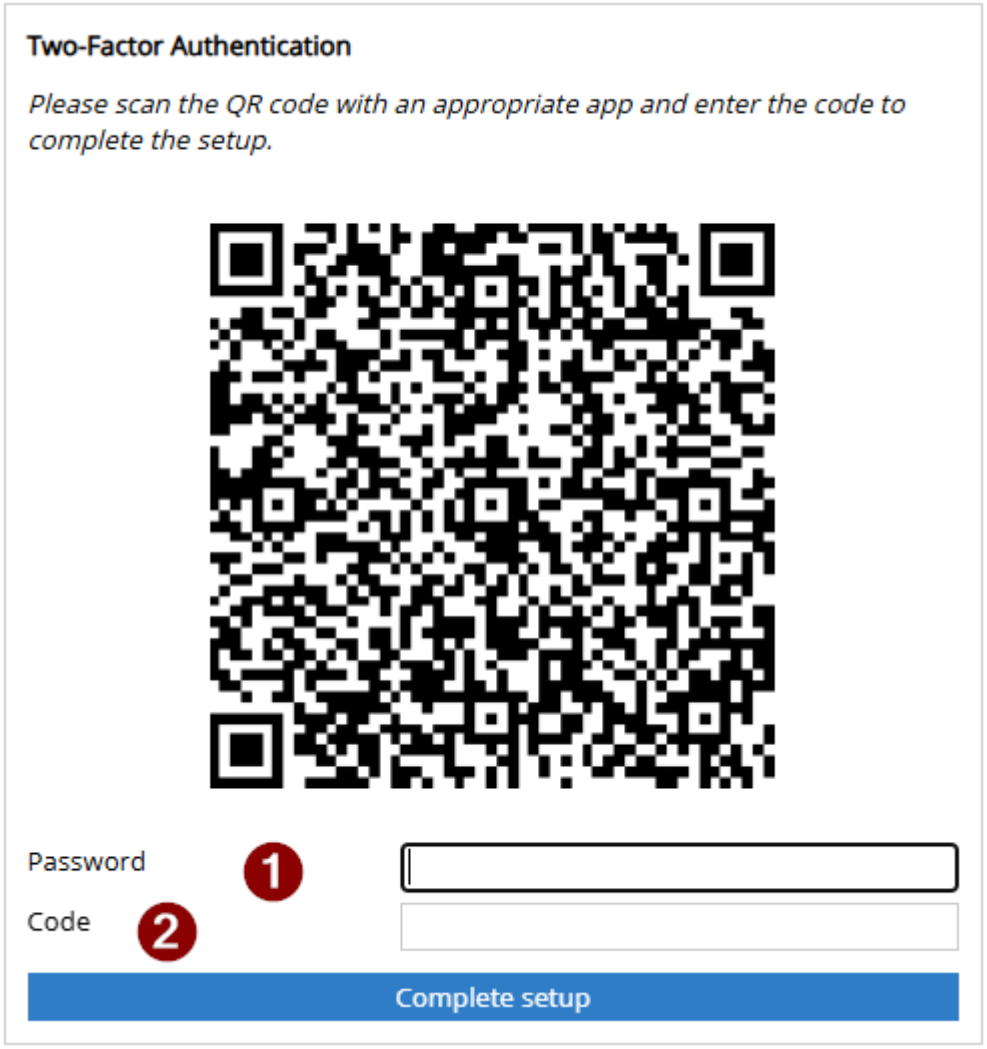
4.5.1 Two-factor authentication

To use an authenticator app (e.g., Microsoft or Google) as a second factor, open the HMI server's configuration page via the HMI Systray and proceed as follows:

1. Open the TcHmiUserManagement Extension tab (1), navigate to the Users section (2), and enable two-factor authentication (3)



2. Scan the QR code using an authenticator app (1). This establishes a connection between the HMI server and the app, and the app's code can be activated using the system administrator password (2).



⇨ After each authentication, the app will request the 6-digit code for login.

4.6 Security

4.6.1 Network

Please note the following guidelines for the secure operation of a TwinCAT HMI application:

1. The TwinCAT HMI Server should not be directly accessible from the Internet. If a remote connection is necessary, it can be established securely via a VPN (Virtual Private Network).
2. Remote access should only take place via HTTPS (Hypertext Transfer Protocol Secure). Unencrypted access via HTTP is permitted only locally. The HMI server issues self-signed certificates. Alternatively, you can configure or generate [▶ 48] your own certificates.
3. Enable the firewall on the operating system running the HMI server and allow access only to the HTTPS endpoints via TCP.

4.6.2 Authentication

Please note the following guidelines for the secure operation of a TwinCAT HMI application:

1. Use complex passwords with a minimum length and include uppercase and lowercase letters, numbers, and special characters.

2. Guest and/or autologin accounts should not have write access.
3. Use two-factor authentication [▶ 51] for remote access and for the system administrator.

5 Appendix

5.1 Return codes

5.1.1 ADS Return Codes

Grouping of error codes:
Global error codes: 0x0000 [▶ 54]... (0x9811_0000 ...)
Router error codes: 0x500 [▶ 54]... (0x9811_0500 ...)
General ADS errors: 0x700 [▶ 55]... (0x9811_0700 ...)
RTime error codes: 0x1000 [▶ 56]... (0x9811_1000 ...)

Global error codes

Hex	Dec	HRESULT	Name	Description
0x0	0	0x98110000	ERR_NOERROR	No error.
0x1	1	0x98110001	ERR_INTERNAL	Internal error.
0x2	2	0x98110002	ERR_NORTIME	No real time.
0x3	3	0x98110003	ERR_ALLOCLOCKEDMEM	Allocation locked – memory error.
0x4	4	0x98110004	ERR_INSERTMAILBOX	Mailbox full – the ADS message could not be sent. Reducing the number of ADS messages per cycle will help.
0x5	5	0x98110005	ERR_WRONGRECEIVEHMSG	Wrong HMSG.
0x6	6	0x98110006	ERR_TARGETPORTNOTFOUND	Target port not found – ADS server is not started, not reachable or not installed.
0x7	7	0x98110007	ERR_TARGETMACHINENOTFOUND	Target computer not found – AMS route was not found.
0x8	8	0x98110008	ERR_UNKNOWNCMDID	Unknown command ID.
0x9	9	0x98110009	ERR_BADTASKID	Invalid task ID.
0xA	10	0x9811000A	ERR_NOIO	No IO.
0xB	11	0x9811000B	ERR_UNKNOWNAMSCMD	Unknown AMS command.
0xC	12	0x9811000C	ERR_WIN32ERROR	Win32 error.
0xD	13	0x9811000D	ERR_PORTNOTCONNECTED	Port not connected.
0xE	14	0x9811000E	ERR_INVALIDAMSLENGTH	Invalid AMS length.
0xF	15	0x9811000F	ERR_INVALIDAMSNETID	Invalid AMS Net ID.
0x10	16	0x98110010	ERR_LOWINSTLEVEL	Installation level is too low –TwinCAT 2 license error.
0x11	17	0x98110011	ERR_NODEBUGINTAVAILABLE	No debugging available.
0x12	18	0x98110012	ERR_PORTDISABLED	Port disabled – TwinCAT system service not started.
0x13	19	0x98110013	ERR_PORTALREADYCONNECTED	Port already connected.
0x14	20	0x98110014	ERR_AMSSYNC_W32ERROR	AMS Sync Win32 error.
0x15	21	0x98110015	ERR_AMSSYNC_TIMEOUT	AMS Sync Timeout.
0x16	22	0x98110016	ERR_AMSSYNC_AMSERROR	AMS Sync error.
0x17	23	0x98110017	ERR_AMSSYNC_NOINDEXINMAP	No index map for AMS Sync available.
0x18	24	0x98110018	ERR_INVALIDAMSPORT	Invalid AMS port.
0x19	25	0x98110019	ERR_NOMEMORY	No memory.
0x1A	26	0x9811001A	ERR_TCPSEND	TCP send error.
0x1B	27	0x9811001B	ERR_HOSTUNREACHABLE	Host unreachable.
0x1C	28	0x9811001C	ERR_INVALIDAMSFRAGMENT	Invalid AMS fragment.
0x1D	29	0x9811001D	ERR_TLSSEND	TLS send error – secure ADS connection failed.
0x1E	30	0x9811001E	ERR_ACCESSDENIED	Access denied – secure ADS access denied.

Router error codes

Hex	Dec	HRESULT	Name	Description
0x500	1280	0x98110500	ROUTERERR_NOLOCKEDMEMORY	Locked memory cannot be allocated.
0x501	1281	0x98110501	ROUTERERR_RESIZEMEMORY	The router memory size could not be changed.
0x502	1282	0x98110502	ROUTERERR_MAILBOXFULL	The mailbox has reached the maximum number of possible messages.

Hex	Dec	HRESULT	Name	Description
0x503	1283	0x98110503	ROUTERERR_DEBUGBOXFULL	The Debug mailbox has reached the maximum number of possible messages.
0x504	1284	0x98110504	ROUTERERR_UNKNOWNPORTTYPE	The port type is unknown.
0x505	1285	0x98110505	ROUTERERR_NOTINITIALIZED	The router is not initialized.
0x506	1286	0x98110506	ROUTERERR_PORTALREADYINUSE	The port number is already assigned.
0x507	1287	0x98110507	ROUTERERR_NOTREGISTERED	The port is not registered.
0x508	1288	0x98110508	ROUTERERR_NOMOREQUEUES	The maximum number of ports has been reached.
0x509	1289	0x98110509	ROUTERERR_INVALIDPORT	The port is invalid.
0x50A	1290	0x9811050A	ROUTERERR_NOTACTIVATED	The router is not active.
0x50B	1291	0x9811050B	ROUTERERR_FRAGMENTBOXFULL	The mailbox has reached the maximum number for fragmented messages.
0x50C	1292	0x9811050C	ROUTERERR_FRAGMENTTIMEOUT	A fragment timeout has occurred.
0x50D	1293	0x9811050D	ROUTERERR_TOBEREMOVED	The port is removed.

General ADS error codes

Hex	Dec	HRESULT	Name	Description
0x700	1792	0x98110700	ADSERR_DEVICE_ERROR	General device error.
0x701	1793	0x98110701	ADSERR_DEVICE_SRVNOTSUPP	Service is not supported by the server.
0x702	1794	0x98110702	ADSERR_DEVICE_INVALIDGRP	Invalid index group.
0x703	1795	0x98110703	ADSERR_DEVICE_INVALIDOFFSET	Invalid index offset.
0x704	1796	0x98110704	ADSERR_DEVICE_INVALIDACCESS	Reading or writing not permitted. Several causes are possible. For example, an incorrect password was entered when creating routes.
0x705	1797	0x98110705	ADSERR_DEVICE_INVALIDSIZE	Parameter size not correct.
0x706	1798	0x98110706	ADSERR_DEVICE_INVALIDDATA	Invalid data values.
0x707	1799	0x98110707	ADSERR_DEVICE_NOTREADY	Device is not ready to operate.
0x708	1800	0x98110708	ADSERR_DEVICE_BUSY	Device is busy.
0x709	1801	0x98110709	ADSERR_DEVICE_INVALIDCONTEXT	Invalid operating system context. This can result from use of ADS blocks in different tasks. It may be possible to resolve this through multitasking synchronization in the PLC.
0x70A	1802	0x9811070A	ADSERR_DEVICE_NOMEMORY	Insufficient memory.
0x70B	1803	0x9811070B	ADSERR_DEVICE_INVALIDPARM	Invalid parameter values.
0x70C	1804	0x9811070C	ADSERR_DEVICE_NOTFOUND	Not found (files, ...).
0x70D	1805	0x9811070D	ADSERR_DEVICE_SYNTAX	Syntax error in file or command.
0x70E	1806	0x9811070E	ADSERR_DEVICE_INCOMPATIBLE	Objects do not match.
0x70F	1807	0x9811070F	ADSERR_DEVICE_EXISTS	Object already exists.
0x710	1808	0x98110710	ADSERR_DEVICE_SYMBOLNOTFOUND	Symbol not found.
0x711	1809	0x98110711	ADSERR_DEVICE_SYMBOLVERSIONINVALID	Invalid symbol version. This can occur due to an online change. Create a new handle.
0x712	1810	0x98110712	ADSERR_DEVICE_INVALIDSTATE	Device (server) is in invalid state.
0x713	1811	0x98110713	ADSERR_DEVICE_TRANSMODENOTSUPP	AdsTransMode not supported.
0x714	1812	0x98110714	ADSERR_DEVICE_NOTIFYHNDINVALID	Notification handle is invalid.
0x715	1813	0x98110715	ADSERR_DEVICE_CLIENTUNKNOWN	Notification client not registered.
0x716	1814	0x98110716	ADSERR_DEVICE_NOMOREHDLS	No further handle available.
0x717	1815	0x98110717	ADSERR_DEVICE_INVALIDWATCHSIZE	Notification size too large.
0x718	1816	0x98110718	ADSERR_DEVICE_NOTINIT	Device not initialized.
0x719	1817	0x98110719	ADSERR_DEVICE_TIMEOUT	Device has a timeout.
0x71A	1818	0x9811071A	ADSERR_DEVICE_NOINTERFACE	Interface query failed.
0x71B	1819	0x9811071B	ADSERR_DEVICE_INVALIDINTERFACE	Wrong interface requested.
0x71C	1820	0x9811071C	ADSERR_DEVICE_INVALIDCLSID	Class ID is invalid.
0x71D	1821	0x9811071D	ADSERR_DEVICE_INVALIDOBJID	Object ID is invalid.
0x71E	1822	0x9811071E	ADSERR_DEVICE_PENDING	Request pending.
0x71F	1823	0x9811071F	ADSERR_DEVICE_ABORTED	Request is aborted.
0x720	1824	0x98110720	ADSERR_DEVICE_WARNING	Signal warning.
0x721	1825	0x98110721	ADSERR_DEVICE_INVALIDARRAYIDX	Invalid array index.
0x722	1826	0x98110722	ADSERR_DEVICE_SYMBOLNOTACTIVE	Symbol not active.

Hex	Dec	HRESULT	Name	Description
0x723	1827	0x98110723	ADSERR_DEVICE_ACCESSDENIED	Access denied. Several causes are possible. For example, a unidirectional ADS route is used in the opposite direction.
0x724	1828	0x98110724	ADSERR_DEVICE_LICENSENOTFOUND	Missing license.
0x725	1829	0x98110725	ADSERR_DEVICE_LICENSEEXPIRED	License expired.
0x726	1830	0x98110726	ADSERR_DEVICE_LICENSEEXCEEDED	License exceeded.
0x727	1831	0x98110727	ADSERR_DEVICE_LICENSEINVALID	Invalid license.
0x728	1832	0x98110728	ADSERR_DEVICE_LICENSESYSTEMID	License problem: System ID is invalid.
0x729	1833	0x98110729	ADSERR_DEVICE_LICENSENOTIMELIMIT	License not limited in time.
0x72A	1834	0x9811072A	ADSERR_DEVICE_LICENSEFUTUREISSUE	Licensing problem: time in the future.
0x72B	1835	0x9811072B	ADSERR_DEVICE_LICENSETIMETOLONG	License period too long.
0x72C	1836	0x9811072C	ADSERR_DEVICE_EXCEPTION	Exception at system startup.
0x72D	1837	0x9811072D	ADSERR_DEVICE_LICENSEDUPLICATED	License file read twice.
0x72E	1838	0x9811072E	ADSERR_DEVICE_SIGNATUREINVALID	Invalid signature.
0x72F	1839	0x9811072F	ADSERR_DEVICE_CERTIFICATEINVALID	Invalid certificate.
0x730	1840	0x98110730	ADSERR_DEVICE_LICENSEOEMNOTFOUND	Public key not known from OEM.
0x731	1841	0x98110731	ADSERR_DEVICE_LICENSERESTRICTED	License not valid for this system ID.
0x732	1842	0x98110732	ADSERR_DEVICE_LICENSEDEMODENIED	Demo license prohibited.
0x733	1843	0x98110733	ADSERR_DEVICE_INVALIDFNCID	Invalid function ID.
0x734	1844	0x98110734	ADSERR_DEVICE_OUTOFRANGE	Outside the valid range.
0x735	1845	0x98110735	ADSERR_DEVICE_INVALIDALIGNMENT	Invalid alignment.
0x736	1846	0x98110736	ADSERR_DEVICE_LICENSEPLATFORM	Invalid platform level.
0x737	1847	0x98110737	ADSERR_DEVICE_FORWARD_PL	Context – forward to passive level.
0x738	1848	0x98110738	ADSERR_DEVICE_FORWARD_DL	Context – forward to dispatch level.
0x739	1849	0x98110739	ADSERR_DEVICE_FORWARD_RT	Context – forward to real-time.
0x740	1856	0x98110740	ADSERR_CLIENT_ERROR	Client error.
0x741	1857	0x98110741	ADSERR_CLIENT_INVALIDPARM	Service contains an invalid parameter.
0x742	1858	0x98110742	ADSERR_CLIENT_LISTEMPTY	Polling list is empty.
0x743	1859	0x98110743	ADSERR_CLIENT_VARUSED	Var connection already in use.
0x744	1860	0x98110744	ADSERR_CLIENT_DUPLINVOKEID	The called ID is already in use.
0x745	1861	0x98110745	ADSERR_CLIENT_SYNCTIMEOUT	Timeout has occurred – the remote terminal is not responding in the specified ADS timeout. The route setting of the remote terminal may be configured incorrectly.
0x746	1862	0x98110746	ADSERR_CLIENT_W32ERROR	Error in Win32 subsystem.
0x747	1863	0x98110747	ADSERR_CLIENT_TIMEOUTINVALID	Invalid client timeout value.
0x748	1864	0x98110748	ADSERR_CLIENT_PORTNOTOPEN	Port not open.
0x749	1865	0x98110749	ADSERR_CLIENT_NOAMSADDR	No AMS address.
0x750	1872	0x98110750	ADSERR_CLIENT_SYNCINTERNAL	Internal error in Ads sync.
0x751	1873	0x98110751	ADSERR_CLIENT_ADDHASH	Hash table overflow.
0x752	1874	0x98110752	ADSERR_CLIENT_REMOVEHASH	Key not found in the table.
0x753	1875	0x98110753	ADSERR_CLIENT_NOMORESYM	No symbols in the cache.
0x754	1876	0x98110754	ADSERR_CLIENT_SYNCRESINVALID	Invalid response received.
0x755	1877	0x98110755	ADSERR_CLIENT_SYNCPORTLOCKED	Sync Port is locked.
0x756	1878	0x98110756	ADSERR_CLIENT_REQUESTCANCELLED	The request was canceled.

RTime error codes

Hex	Dec	HRESULT	Name	Description
0x1000	4096	0x98111000	RTERR_INTERNAL	Internal error in the real-time system.
0x1001	4097	0x98111001	RTERR_BADTIMERPERIODS	Timer value is not valid.
0x1002	4098	0x98111002	RTERR_INVALIDTASKPTR	Task pointer has the invalid value 0 (zero).
0x1003	4099	0x98111003	RTERR_INVALIDSTACKPTR	Stack pointer has the invalid value 0 (zero).
0x1004	4100	0x98111004	RTERR_PRIOEXISTS	The request task priority is already assigned.
0x1005	4101	0x98111005	RTERR_NOMORETCB	No free TCB (Task Control Block) available. The maximum number of TCBs is 64.
0x1006	4102	0x98111006	RTERR_NOMORESEMAS	No free semaphores available. The maximum number of semaphores is 64.
0x1007	4103	0x98111007	RTERR_NOMOREQUEUES	No free space available in the queue. The maximum number of positions in the queue is 64.

Hex	Dec	HRESULT	Name	Description
0x100D	4109	0x9811100D	RTERR_EXTIRQALREADYDEF	An external synchronization interrupt is already applied.
0x100E	4110	0x9811100E	RTERR_EXTIRQNOTDEF	No external sync interrupt applied.
0x100F	4111	0x9811100F	RTERR_EXTIRQINSTALLFAILED	Application of the external synchronization interrupt has failed.
0x1010	4112	0x98111010	RTERR_IRQLNOTLESSOREQUAL	Call of a service function in the wrong context
0x1017	4119	0x98111017	RTERR_VMXNOTSUPPORTED	Intel® VT-x extension is not supported.
0x1018	4120	0x98111018	RTERR_VMXDISABLED	Intel® VT-x extension is not enabled in the BIOS.
0x1019	4121	0x98111019	RTERR_VMXCONTROLSMISSING	Missing function in Intel® VT-x extension.
0x101A	4122	0x9811101A	RTERR_VMXENABLEFAILS	Activation of Intel® VT-x fails.

Specific positive HRESULT Return Codes:

HRESULT	Name	Description
0x0000_0000	S_OK	No error.
0x0000_0001	S_FALSE	No error. Example: successful processing, but with a negative or incomplete result.
0x0000_0203	S_PENDING	No error. Example: successful processing, but no result is available yet.
0x0000_0256	S_WATCHDOG_TIMEOUT	No error. Example: successful processing, but a timeout occurred.

TCP Winsock error codes

Hex	Dec	Name	Description
0x274C	10060	WSAETIMEDOUT	A connection timeout has occurred - error while establishing the connection, because the remote terminal did not respond properly after a certain period of time, or the established connection could not be maintained because the connected host did not respond.
0x274D	10061	WSAECONNREFUSED	Connection refused - no connection could be established because the target computer has explicitly rejected it. This error usually results from an attempt to connect to a service that is inactive on the external host, that is, a service for which no server application is running.
0x2751	10065	WSAEHOSTUNREACH	No route to host - a socket operation referred to an unavailable host.
More Winsock error codes: Win32 error codes			

5.1.2 HMI_ADS_CONSTANTS Enumeration

Return codes of the TcHmiAds extension.

Namespace: TcHmiAds
Assembly: TcHmiAds (in TcHmiAds.dll) Version: 1.0.0.0 (1.0.0.0)

Members

	Hex	Dec	Member name	Value	Description
	0x0	0	HMI_ADS_SUCCESS	0	No error, everything fine
	0x100000	1048576	HMI_ADS_E_OFFSET	1048576	Offset of TcHmiAds specific error codes
	0x100010	1048592	HMI_ADS_E_TCDIR	1048592	TwinCAT directory not found on local system
	0x100011	1048593	HMI_ADS_E_TCVERSION	1048593	TwinCAT version invalid
	0x100012	1048594	HMI_ADS_E_CONFIGDIR	1048594	TwinCAT configuration directory not found
	0x100013	1048595	HMI_ADS_E_STATE	1048595	TwinCAT Router is in invalid state no port could be opened
	0x100020	1048608	HMI_ADS_E_PARSE_BASETYPES	1048608	Error while parsing ADS base types
	0x100021	1048609	HMI_ADS_E_PARSE_DATA	1048609	Error while parsing ADS data

	Hex	Dec	Member name	Value	Description
	0x100022	1048610	HMI_ADS_E_NOT_IMPLEMENTED	1048610	Function not implemented (trying to write a reference value)
	0x100030	1048624	HMI_ADS_E_INVALID_DATA	1048624	Invalid data written to server or an ADS datatype can not be parsed
	0x100031	1048625	HMI_ADS_E_UPLOAD_DATA	1048625	No upload data provided by configured ADS runtime
	0x100032	1048626	HMI_ADS_E_UNEXPECTED	1048626	Should not happen contact support
	0x100033	1048627	HMI_ADS_E_INVALID_RUNTIME	1048627	Runtime name is empty or invalid
	0x100034	1048628	HMI_ADS_E_INVALID_PARAMETER	1048628	A parameter of the requested function is invalid
	0x100035	1048629	HMI_ADS_E_NO_OFFLINE_DATA	1048629	No offline data available
	0x100036	1048630	HMI_ADS_E_INVALID_SYMBOL	1048630	The requested symbol is not available
	0x100037	1048631	HMI_ADS_E_MISSING_PARAMETER	1048631	A parameter is missing in the requested function
	0x100038	1048632	HMI_ADS_E_ADD_ROUTE	1048632	An ADS route could not be added
	0x100039	1048633	HMI_ADS_E_EMPTY	1048633	No ADS symbols found
	0x10003A	1048634	HMI_ADS_E_DISABLED	1048634	The requested runtime is disabled in the HMI configuration
	0x10003B	1048635	HMI_ADS_E_LICENSE	1048635	A license error occurred
	0x10003C	1048636	HMI_ADS_E_INVALID_SYMBOL_TYPE	1048636	A type from ADS could not be interpreted
	0x10003D	1048637	HMI_ADS_E_INVALID_SYMBOL_HANDLE	1048637	A handle to an ADS symbol has become invalid
	0x10003E	1048638	HMI_ADS_E_ABORTED	1048638	A TCP/IP error occurred

Reference

TcHmiAds Namespace

5.1.3 ErrorValue Enumeration

Namespace: TcHmiSrv
Assembly: TcHmiSrvExtNet (in TcHmiSrvExtNet.dll) Version: 1.0.0.0 (1.0.0.0)

Syntax

C#

```
public enum ErrorValue
```

Members

Member name	Value	Description
HMI_SUCCESS	0	The command was executed successfully.
HMI_FINISHED	1	The operation has finished.
HMI_DISCONNECTED	2	The connection was closed.
HMI_SHUTDOWN	3	The server is shutting down.

Member name	Value	Description
HMI_RESTART	4	The server is restarting.
HMI_SKIP	5	The command was intentionally skipped.
HMI_FIRST_INIT	6	The extension is being initialized for the first time.
HMI_UPGRADE	7	The extension is being upgraded.
HMI_UNCHANGED	8	The data has not changed since the last request.
HMI_IGNORE	9	The command result should be ignored.
HMI_E_SERVER	256	A general server error occurred.
HMI_E_FAIL	257	The command failed with a generic error.
HMI_E_UNEXPECTED	258	An unexpected error occurred.
HMI_E_SCRIPT	259	A script error occurred because a server-side script failed.
HMI_E_REQUIRED_EXTENSION_MISSING	260	An required extension is not available.
HMI_E_INIT	261	Initialization failed.
HMI_E_NO_LANGUAGE_FILE	262	No language file was found for the requested locale.
HMI_E_SYNTAX	263	The request contains invalid syntax.
HMI_E_FILE_NOT_FOUND	264	The requested file was not found on the server.
HMI_E_FILESYSTEM	265	A filesystem error occurred (e.g. permission denied or disk full).
HMI_E_REQUEST_TOO_LARGE	266	The request exceeds the maximum allowed size.
HMI_E_DATABASE	267	A database operation failed.
HMI_E_INVALID_POINTER	268	An invalid pointer was encountered.
HMI_E_INVALID_PARAMETER	269	An invalid parameter was provided.
HMI_E_INVALID_TYPE	270	The type of a value does not match the expected type.
HMI_E_NOT_REGISTERED	271	The requested resource is not registered in the server.
HMI_E_NOT_IMPLEMENTED	272	The requested operation is not implemented.
HMI_E_ID_IN_USE	273	The specified ID is already in use.
HMI_E_SYMBOL_IN_USE	274	The specified symbol name is already in use by another extension.
HMI_E_INTERRUPTED	275	The operation was interrupted before it could complete.
HMI_E_FILE_LOCK	276	The file is locked and cannot be accessed.
HMI_E_FILE_IN_USE	277	The file is currently in use by another process or operation.
HMI_E_FILE_WRITE	278	Unable to write to the file.
HMI_E_INVALID_PATH	279	The specified path is invalid or contains illegal characters.
HMI_E_HANDLE	280	An invalid handle was used.
HMI_E_ENCODE	281	Unable to encode the message (e.g. serialization failure).
HMI_E_DECODE	282	Unable to decode the message (e.g. deserialization failure).
HMI_E_NETWORK	283	A network error occurred during communication.
HMI_E_LANGUAGE	284	The requested language is invalid or not supported.
HMI_E_CACHE	285	A cache error occurred.
HMI_E_ENDPOINT_DENIED	286	Access to the endpoint was denied because the client is not allowed to use this endpoint.
HMI_E_ENDPOINT_BUSY	287	The endpoint is busy and cannot process the request at this time.
HMI_E_ENDPOINT_INVALID	288	The specified endpoint is invalid.
HMI_E_WEBSERVER_UNEXPECTED	289	An unexpected error occurred in the web server component.
HMI_E_WEBSOCKET_UNEXPECTED	290	An unexpected error occurred in the WebSocket component.

Member name	Value	Description
HMI_E_LUA_EXEC	291	A Lua script could not be executed.
HMI_E_ENTRY_NOT_FOUND	292	The requested entry was not found.
HMI_E_INVALID_SYMBOL	293	The specified symbol is invalid or does not exist.
HMI_E_BLACKLISTED	294	The requested resource is blacklisted and cannot be accessed.
HMI_E_UPLOAD_TIMER_EXPIRED	295	The upload timer expired before the upload completed.
HMI_E_SERVER_ALREADY_RUNNING	296	Another instance of the server is already running.
HMI_E_PROTOCOL	297	A protocol error occurred because the request does not conform to the expected protocol.
HMI_E_PAGING	298	Invalid paging parameters were provided.
HMI_E_INVALID_SUBSYMBOL	512	The specified subsymbol path is invalid or does not exist.
HMI_E_SYMBOL_NOT_MAPPED	513	The symbol is not mapped to any extension.
HMI_E_SYMBOL_SCHEMA_MISSING	514	The JSON schema for the symbol is missing.
HMI_E_INVALID_METHOD	515	The specified method does not exist or is not available for this symbol.
HMI_E_API	768	Invalid API usage by an extension.
HMI_E_INTERFACE_VERSION	769	The extension was built against an incompatible interface version.
HMI_E_INTERFACE_POINTER	770	An invalid interface pointer was provided by an extension.
HMI_E_CRT_NOT_FOUND	771	The C runtime library (CRT) required by an extension was not found.
HMI_E_CRT_INIT	772	The C runtime library (CRT) initialization failed in an extension.
HMI_E_LICENSE	773	The license is invalid or missing.
HMI_E_LICENSE_CHECK	774	The license check failed.
HMI_E_LICENSE_ADS	775	The ADS license was not found.
HMI_E_LICENSE_SERVER	776	The server license is missing.
HMI_E_LICENSE_CLIENT	777	The client license is missing.
HMI_E_LICENSE_TARGET	778	The target license is missing
HMI_E_LICENSE_EXPIRED	779	The license has expired.
HMI_E_LICENSE_EXTENSION	780	The extension license is missing.
HMI_E_LICENSE_HANDSHAKE	781	The license handshake failed.
HMI_E_LICENSE_VERIFY	782	The license verification failed.
HMI_E_LICENSE_EMPTY	783	The license is empty.
HMI_E_STORAGE	1280	A general configuration error occurred.
HMI_E_STORAGE_WRITE	1281	Unable to write to the configuration storage.
HMI_E_STORAGE_VERSION	1282	The configuration version is invalid or incompatible.
HMI_E_STORAGE_CREATE	1283	Unable to create the configuration.
HMI_E_STORAGE_STORE	1284	Unable to store a value in the configuration.
HMI_E_STORAGE_LOAD	1285	Unable to load the configuration from storage.
HMI_E_STORAGE_FILE_NOT_FOUND	1286	The configuration file was not found.
HMI_E_STORAGE_ADD_PARAMETER	1287	Error while adding a parameter to the configuration.

Member name	Value	Description
HMI_E_STORAGE_SCHEMA	1288	The configuration schema is invalid.
HMI_E_STORAGE_CONSTRAINT	1289	A configuration constraint was violated (e.g. a uniqueness or value constraint).
HMI_E_STORAGE_ADD	1290	Unable to add a new configuration entry.
HMI_E_STORAGE_EXTENSION	1291	The storage extension is invalid or not available.
HMI_E_STORAGE_PARAMETER	1292	An invalid configuration parameter was provided.
HMI_E_STORAGE_TYPE	1293	The configuration value has an invalid type.
HMI_E_CONNECT	1294	Unable to establish a connection.
HMI_E_STORAGE_BACKUP	1295	Error while creating a configuration backup.
HMI_E_SCHEMA	1536	The JSON schema is invalid.
HMI_E_TYPE_MISMATCH	1537	The value type does not match the type defined in the schema.
HMI_E_RANGE_MISMATCH	1538	The value is outside the range defined in the schema (minimum/maximum).
HMI_E_INVALID_FIELD	1539	The field name is invalid according to the schema.
HMI_E_REQUIRED_FIELD	1540	A required field is missing from the data.
HMI_E_UNEXPECTED_FIELD	1541	The data contains a field that is not defined in the schema (additionalProperties).
HMI_E_ENUM_VALUE_MISMATCH	1542	The value does not match any of the allowed enum values.
HMI_E_ARRAY_RANGE_MISMATCH	1543	The array length is outside the allowed range (minItems/maxItems).
HMI_E_STRING_LENGTH_MISMATCH	1544	The string length is outside the allowed range (minLength/maxLength).
HMI_E_MULTIPLE_MATCHES	1545	Multiple schemas matched when only one was expected (oneOf).
HMI_E_NO_MATCHES	1546	No schema matched the data (oneOf/anyOf).
HMI_E_UNIQUE	1547	A uniqueness constraint was violated (uniqueItems).
HMI_E_FORMAT	1548	The value does not match the expected format (e.g. date-time, uri).
HMI_E_TYPE_MISSING	1549	The type definition is missing from the schema.
HMI_E_EXCLUDED	1550	The value matches a schema that it must not match (not).
HMI_E_MIGRATION	1551	A configuration migration failed.
HMI_E_MIGRATION_RULE	1552	A configuration migration rule is invalid.
HMI_E_MIGRATION_PATH	1553	The migration path is invalid.
HMI_E_RECURSION	1554	A recursion was detected (e.g. circular schema references).
HMI_E_REGEX	1555	The regular expression pattern is invalid.
HMI_E_EXTENSION	2048	An extension returned an error.
HMI_E_EXTENSION_LOAD	2049	Unable to load the extension.
HMI_E_INVALID_DOMAIN	2050	The specified extension domain is invalid.
HMI_E_DOMAIN_ACTIVE	2051	The extension domain is currently active and cannot be modified.
HMI_E_LOG_EXTENSION	2052	No logger extension was found.
HMI_E_AUTH_EXTENSION	2053	No authentication extension was found.
HMI_E_EXTENSION_CONFIG	2054	The extension configuration is invalid.
HMI_E_EXTENSION_HANDLER	2055	The extension handler is invalid.
HMI_E_UNLOAD_FAILED	2056	The extension could not be unloaded.

Member name	Value	Description
HMI_E_AUTH_WAIT	2057	Too many failed login attempts.
HMI_E_DOMAIN_DISABLED	2058	The extension domain is disabled and cannot process requests.
HMI_E_EXTENSION_CONNECT	2059	Unable to connect to the extension.
HMI_E_REMOTE_CONNECT	2060	Unable to connect to the remote system.
HMI_E_REMOTE_TIMEOUT	2061	The remote system did not respond within the expected time.
HMI_E_SESSION	4096	A general session error occurred.
HMI_E_INVALID_SESSION	4097	The session ID is invalid.
HMI_E_AUTH_USER_NOT_FOUND	4098	The specified user was not found.
HMI_E_AUTH_FAILED	4099	Authentication failed.
HMI_E_AUTH_GROUP_NOT_FOUND	4100	The specified user group was not found.
HMI_E_INSUFFICIENT_ACCESS	4101	The user does not have sufficient access rights for this operation.
HMI_E_CREATE_SESSION	4102	Unable to create a new session.
HMI_E_SESSION_NOT_FOUND	4103	The specified session was not found.
HMI_E_CERTIFICATE	4104	A certificate error occurred.
HMI_E_NO_LOGIN_DATA	4105	No login data was provided.
HMI_E_ALREADY_LOGGED_IN	4106	The user is already logged in with this session.
HMI_E_SESSION_TIMEOUT	4107	The session has timed out due to inactivity.
HMI_E_TOO_MANY_CONNECTIONS	4108	The maximum number of concurrent connections has been reached.
HMI_E_DECRYPT	4109	Unable to decrypt the data (e.g. encrypted login credentials).
HMI_E_AUTH_DISABLED	4110	Authentication is disabled in the server configuration.
HMI_E_CERTIFICATE_NOT_VALID	4111	The provided certificate is not valid (expired, revoked, or untrusted).
HMI_E_AUTH_INSUFFICIENT_LOGIN_INFORMATION	4112	The login request does not contain enough information to authenticate the user.
HMI_E_CHECKSUM	4608	A general checksum error occurred.
HMI_E_INVALID_CHECKSUM	4609	The checksum is invalid.
HMI_E_CHECKSUM_UNEXPECTED	4610	An unexpected checksum was found where none was expected.
HMI_E_CHECKSUM_MATCH	4611	The checksum does not match the expected value.
HMI_E_SIGNATURE	4612	A general signature error occurred.
HMI_E_SIGNATURE_MISSING	4613	The required signature is missing from the configuration file.
HMI_E_SIGNATURE_MISMATCH	4614	The signature does not match the data.
HMI_E_KEY_MISSING	4615	The security key required for signature verification is missing.
HMI_E_RESTART_REQUIRED	4616	A server restart is required for the configuration change to take effect.
HMI_E_INITIALIZE_PASSWORD	4617	The admin password has not been initialized.

Reference

TcHmiSrv Namespace

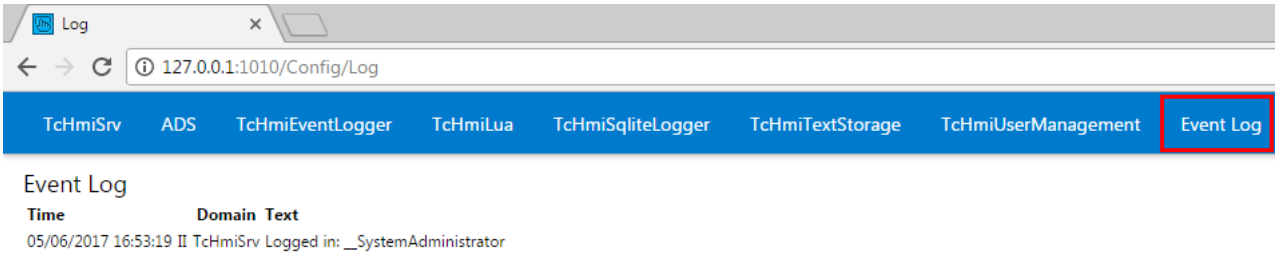
5.2 Troubleshooting

The product version number can be read via the system tray icon  . Additional information is required:

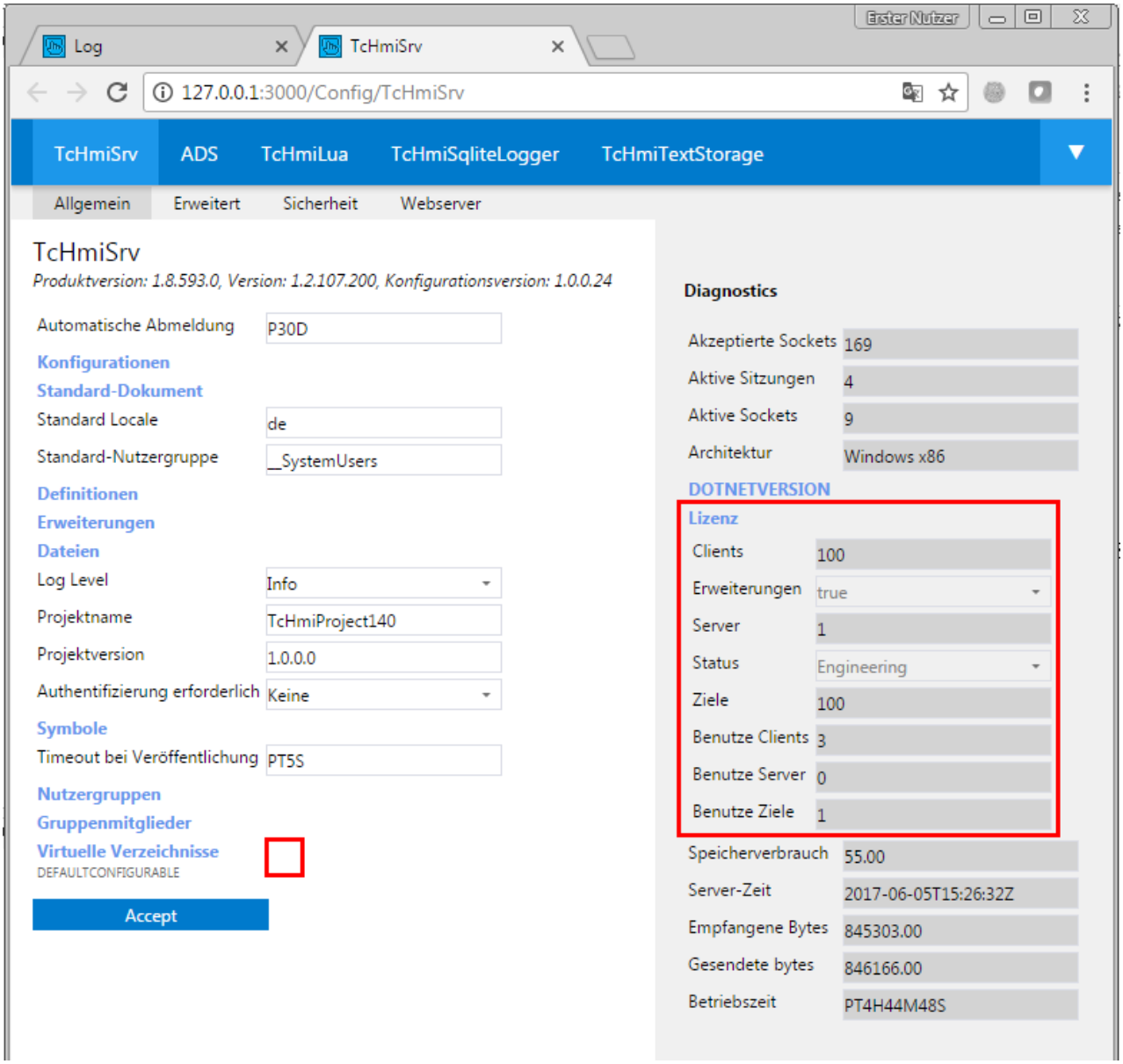
- Operating system
- Event log
- Memory images (if available)

5.2.1 Config page

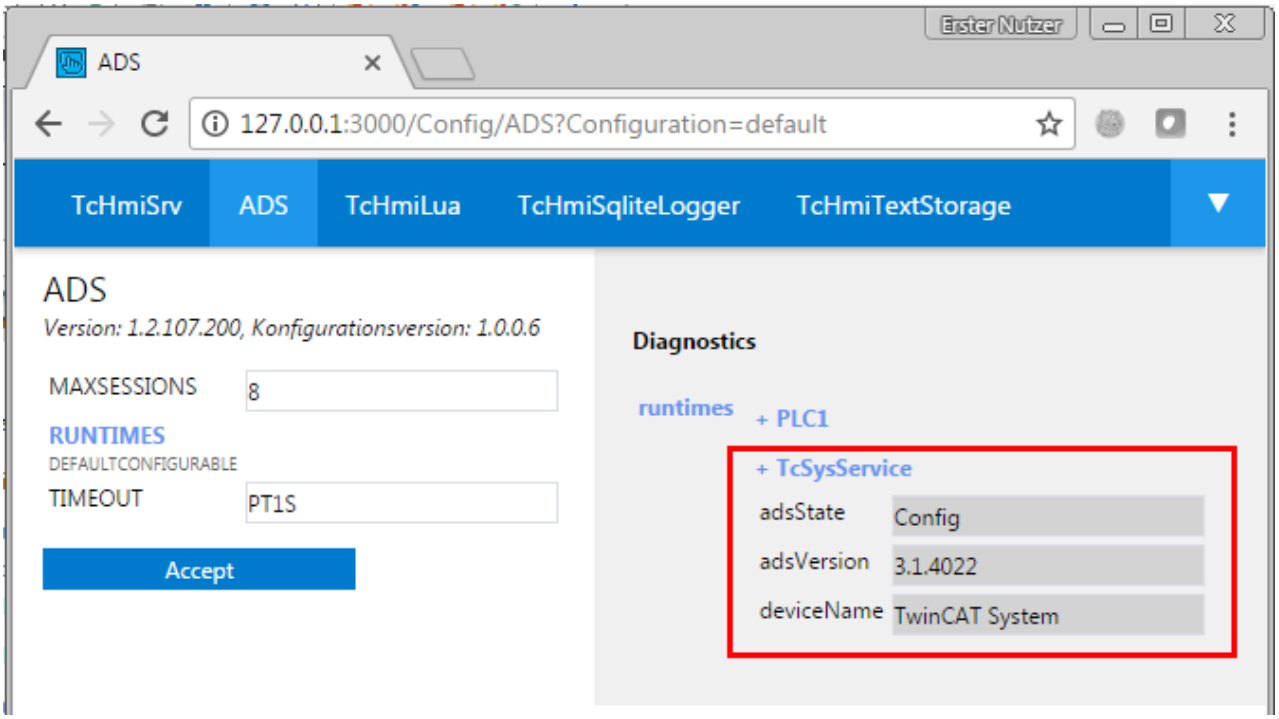
The configuration page of the TwinCAT HMI server provides access to the event log of the server, which can provide important information.



In addition, the page offers further diagnostic information. The **TcHmiSrv** category shows the supported .NET versions and the status of the licenses.



Under the **ADS** category you can read out the status of the configured TwinCAT system.



5.2.2 Crash dumps

If the server crashes, an attempt is made to write an image of the process (TcHmiSrv.exe). This can then be found in the working directory of the server under *Windows: \ProgramData\Beckhoff\TF2000 TwinCAT 3 HMI Server.*

After a server restart the image is compressed (extension .tar.gz). Please send this image to support, including the product version number, the configuration (logger.db and storage.db) and, if possible, a description of the last steps you performed before the crash, so that we can reproduce the malfunction.

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Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20
33415 Verl
Germany

Phone:	+49 5246 963-0
e-mail:	info@beckhoff.com
web:	www.beckhoff.com

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More Information:
www.beckhoff.com/tf2000

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com