

How to use FTP and TFTP

This application note describes how to use FTP and TFTP for file transfer with the Festo CODESYS V3 PLCs CECC-... and CPX-CEC-...-V3

CECC-...
CPX-CEC-...-V3

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Table of contents

1	Components/Software used	4
2	Overview	5
2.1	Architecture.....	5
3	Start FTP/TFTP server of the device	6
3.1	Step one – Establish telnet connection to device	6
3.2	Step two – Start the device's FTP/TFTP server	6
3.2.1	FTP server	6
3.2.2	TFTP server	7
3.3	Step three – Start and connect the PC's FTP/TFTP client with the server.....	8
3.3.1	FTP clients.....	8
3.3.2	TFTP clients.....	13
4	Stop FTP/TFTP server of the device	15
4.1	Stop FTP server of the device	15
4.2	Stop TFTP server of the device	15
5	Start server automatically on every power up	16
6	Completely remove automatic start of the FTP/TFTP Server	18
6.1	Via CODESYS register "Files"	18
6.2	Via telnet	18

1 Components/Software used

Type/Name	Version Software/Firmware	Date of manufacture
CECC-X-...	>= 2.1.0	29.10.2015
CECC-S/D/LK	>= 1.3.8-cecc0	18.02.2015
CPX-CEC-...-V3	--	--

Table 1.1: 1 Components/Software used

2 Overview

If you want to transfer files via FTP or TFTP between the PC and your Festo device you can follow this application note.

FTP

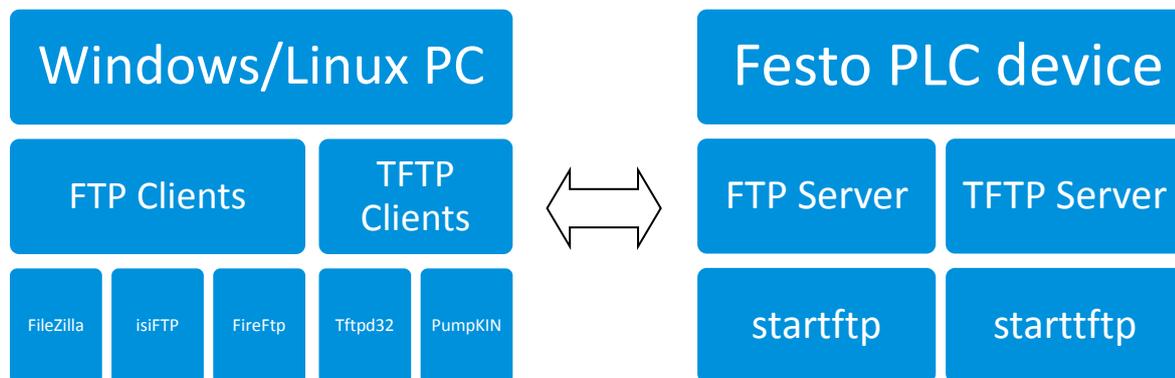
FTP (file transfer protocol) is a complete, session-oriented, general purpose file transfer protocol. It can be used interactively. FTP depends on TCP, is connection oriented, and provides reliable control.

TFTP

TFTP (trivial file transfer protocol) is used as a bare-bones special purpose file transfer protocol. It allows only unidirectional transfer of files. TFTP depends on UDP, requires less overhead, and provides virtually no control.

2.1 Architecture

A FTP/TFTP server **MUST** be enabled on the Festo device to transfer files. On the PC side you can use any FTP/TFTP client of your choice to exchange files.



Note

The permanent flash file storage place is located at the directory path `/ffx/`.
 The permanent default CODESYS file storage path is set to `/ffx/codesys/prj/`.
 For non-permanent files (files only in RAM memory => automatically deleted after a device's power down) use the directory path `/tmp/`.

3 Start FTP/TFTP server of the device

3.1 Step one – Establish telnet connection to device

Click on [Start][Execute...]

Enter the command `cmd` (for Windows) to open a command shell and press **ENTER**.

To login to the device start a telnet connection with the command `telnet <IP address>`

Replace the part <IP address> with your appropriate settings like `telnet 192.168.2.50`

Remember the default IP settings for Festo devices:

Device	Default IP address
CPX-CEC	192.168.2.50
CECC-X-...	192.168.4.2
CECC-S/D/LK	192.168.2.20

Bypass the login in screen finishing each input with key **ENTER** like:

```
<device> login: root
Password: Festo
```

Now you should be connected to the device in telnet terminal mode and see the blinking cursor at the command

```
root@<device> ~$
```

3.2 Step two – Start the device's FTP/TFTP server

3.2.1 FTP server

Start the FTP server on the device entering the following command finishing with **ENTER**:

```
startftp
```

To check whether the FTP server is really running use the command

```
ps
```

Your screen should look something like this:

```
~ # startftp
~ # ps
  PID USER      VSZ STAT COMMAND
    1 root        2152 S   init
...
  190 root        1928 S   /ffx/bin/vsftpd
...
~ #
```

The FTP server is up and running if a line with the character sequence `/vsftpd` appears in the process list.



Note

If you reboot the device, you have to start the FTP server **AGAIN**. If you want to start the server every time your device powers up see section → Start server automatically on every power up later in this document.

3.2.2 TFTP server



Note

The TFTP server is only supported from the CECC-... .

Start the TFTP server on the device entering the following command finishing with **ENTER**:

```
starttftp
```

To check whether the TFTP server is really running use the command

```
ps
```

Your screen should look something like this:

```
~ # ps
  PID USER      VSZ  STAT  COMMAND
    1  root        2152  S     init
  ...
 1783  root        2352  S     /usr/bin/udpsvd -E 0.0.0.0 69 /usr/sbin/tftpd -c -u root
                                     /ffx/transfer
  ...
~ #
```

The TFTP server is up and running if a line with the character sequence `/tftpd` appears in the process list.



Note

The files are stored in the subfolder `/ffx/transfer`.



Note

If you reboot the device, you have to start the TFTP server AGAIN. If you want to start the server every time your device powers up see section → Start server automatically on every power up later in this document.

3.3 Step three – Start and connect the PC's FTP/TFTP client with the server

3.3.1 FTP clients

There are many different FTP clients available for the PC. As an example all single steps to connect to and exchange files with the PLC device of the following freely available FTP-clients will be performed

- Filezilla
- FireFTP (Firefox Plugin)
- isiFTP

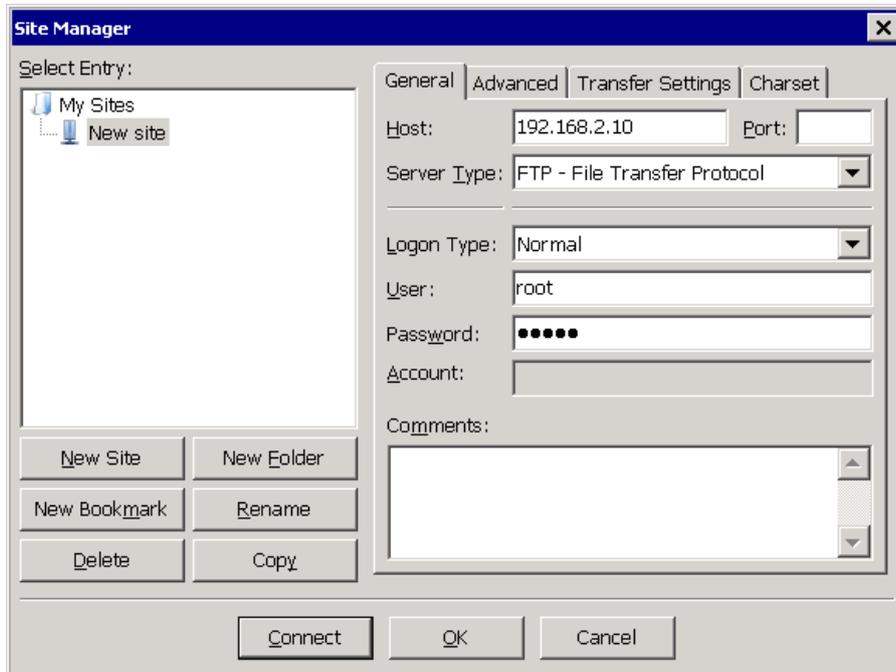
Filezilla

The FTP client FileZilla is an Open Source software and can be downloaded, for instance, at the following address:

<http://filezilla-project.org/download.php?type=client>

The following setup is for a PLC device with the IP address 192.168.2.10.

After the menu item [File][Sitemanager...] the following dialogue box appears in which any number of connection profiles can be created.



If the button "New Site" is clicked, a new profile is created which can be given an individual name.

The IP address of the PLC device is entered in the field "Host:".

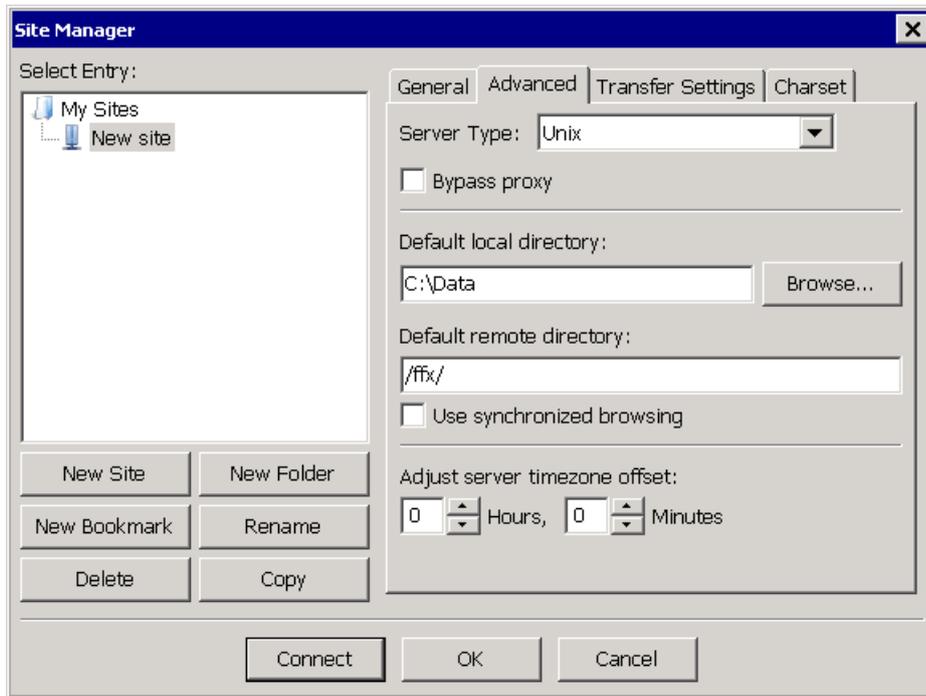
In the field "Server Type:", the item "FTP – File Transfer Protocol" has to be selected.

The "Logon Type:" is "Normal".

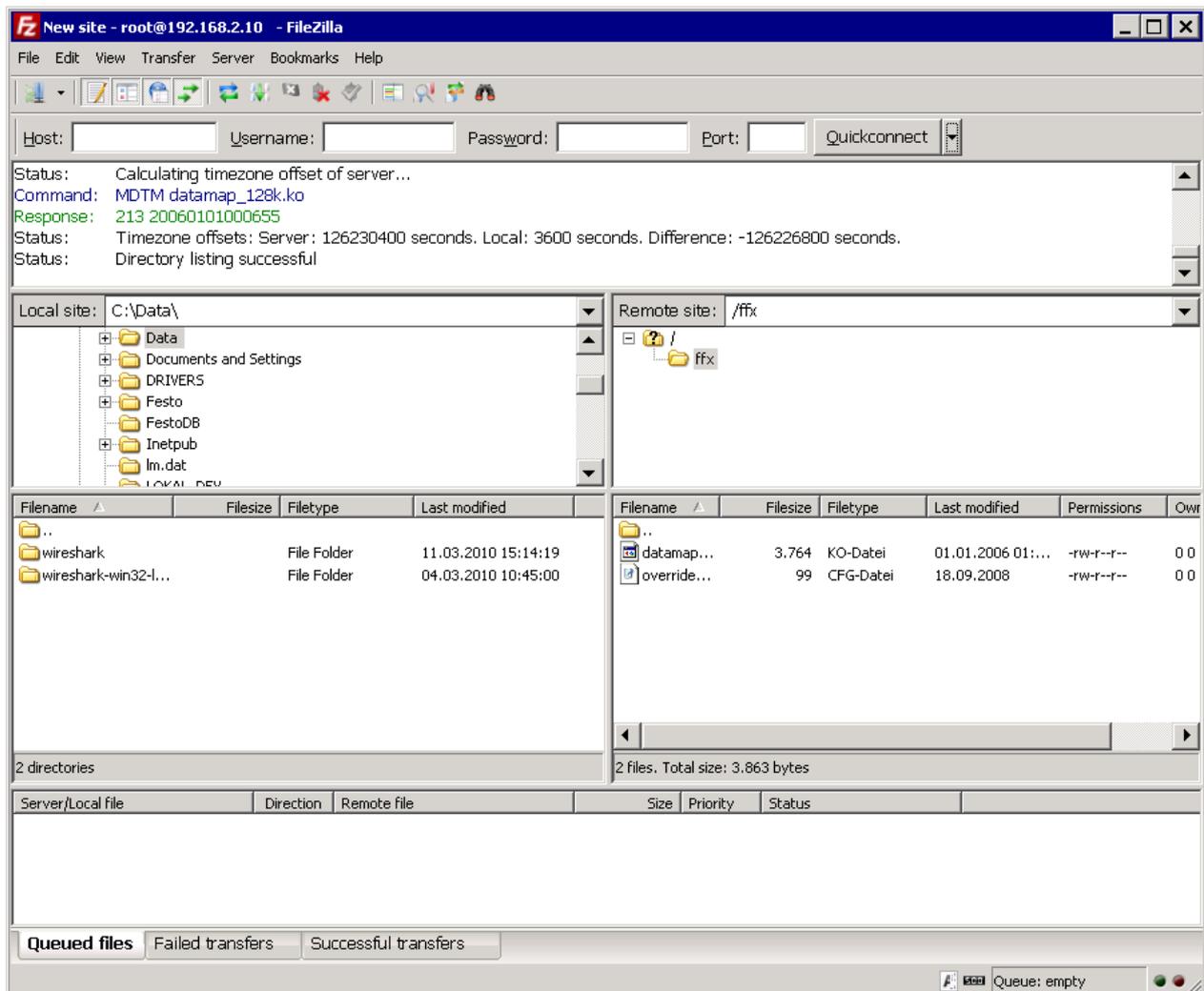
In the field "User:" enter "**root**", as no other user has been created on the device so far.

The field "Password:" should actually be self-explanatory.

In the register "Advanced", the "Default local directory:" (= directory on the PC) and the "Default remote directory:" (= directory on the PLC device) can be specified.



As in Explorer, a corresponding directory can now be selected on both devices.



One or more files can then be transferred to the PLC device via the context menu (right mouse button) and the menu item "Upload".

Start FTP/TFTP server of the device

The file transfer from the device to the PC is carried out accordingly with the command "Download".



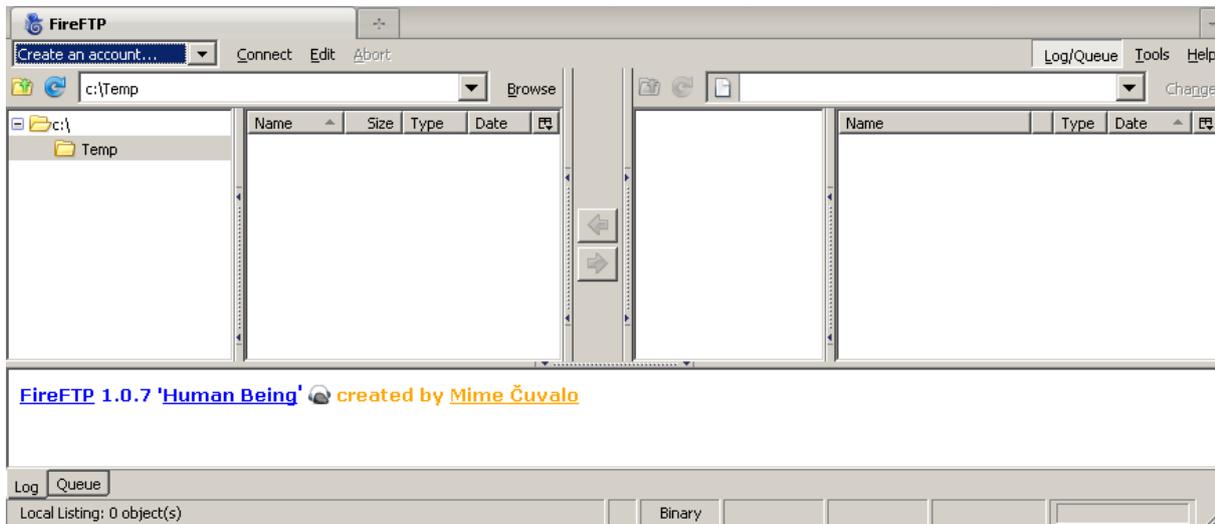
Note
Unlike with the TFTP transfer, if the FTP client is used the connection between device and PC continues to be sustained (depending on the configuration of the FTP client). If the connection is no longer required, it should be cut off manually.

FireFTP (Firefox Plugin)

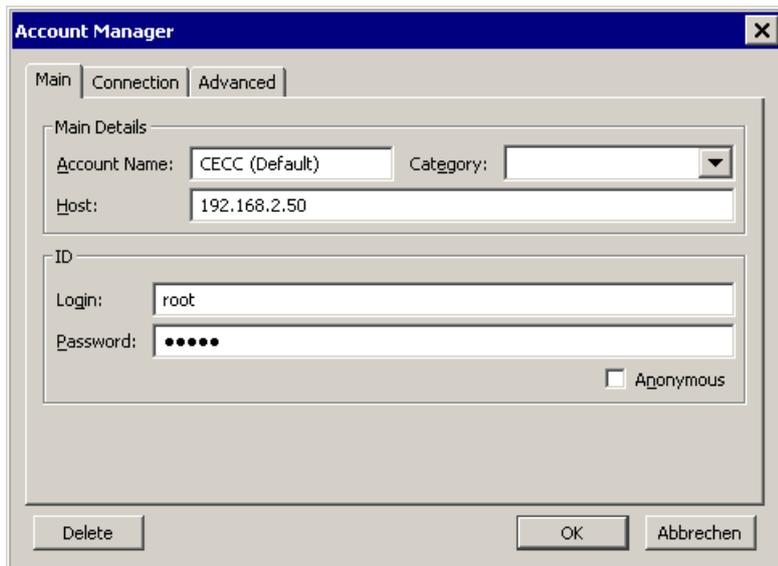
The FTP client "FireFTP" is an Add-on for the web browser Firefox (<https://www.mozilla.org>) and can be downloaded at the following address: <https://addons.mozilla.org/de/firefox/addon/684>

The following setup is for a PLC device with the IP address 192.168.2.50.

Start the Add-on at the menu [Tools][FireFtp] and you get a new register like the following one:



Open the combo box on the left side and select the option "Create a new account..."



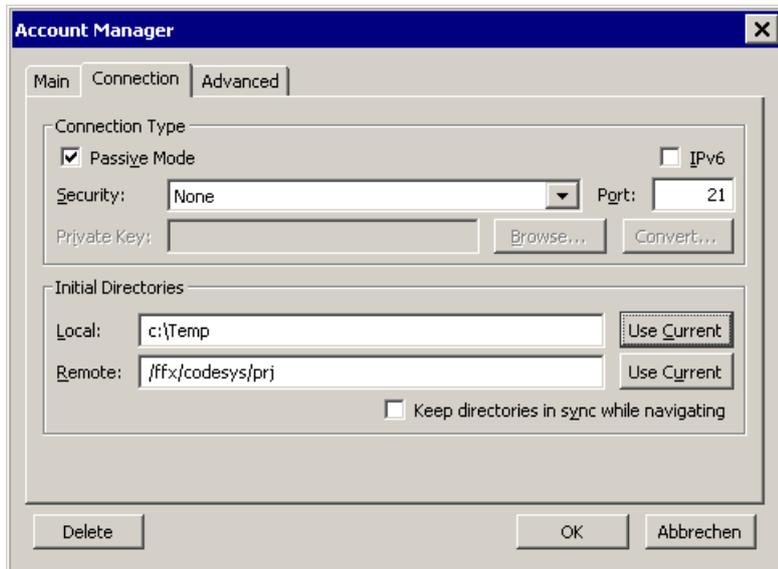
In the register "Main" fill in the following fields.

Enter any character sequence to describe your connection at the field "Account Name:".

The IP address of the PLC device is entered in the field "Host:".

In the field "Login:" enter "root", as no other user has been created on the device so far.

The field "Password:" should actually be self-explanatory.

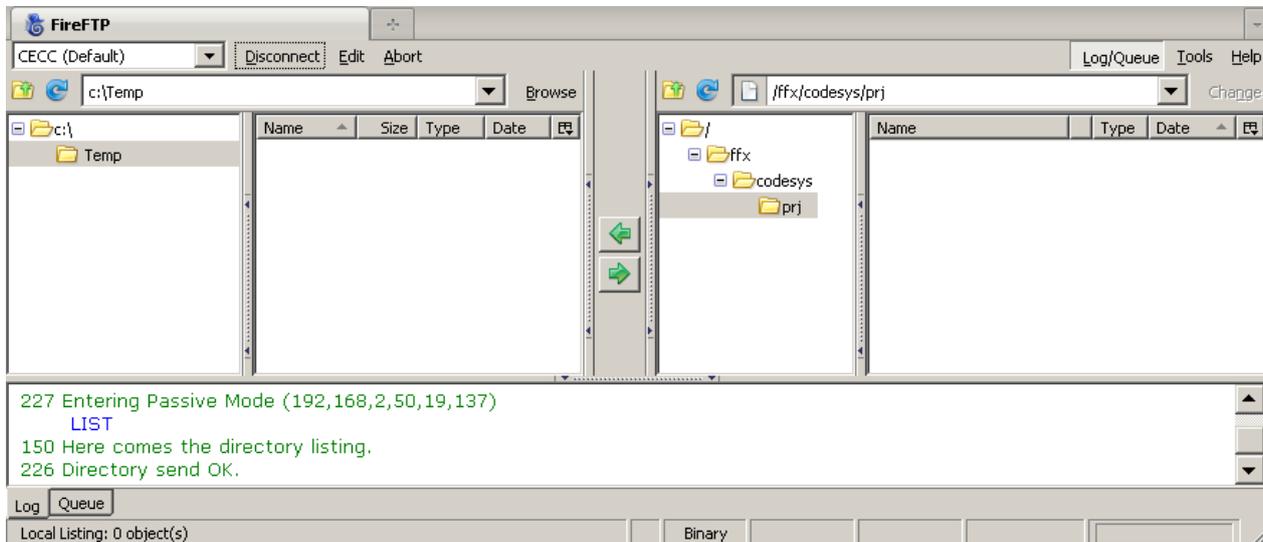


In the register "Connection", you can setup the initial start-up directories. The "Local:" (= directory on the PC) and the "Remote:" (= directory on the PLC device) can be specified.

Finish the Account Manager setup with the button **OK**.

Select the new created account at the combo box (i. e. "CECC (Default)") and click on the button **Connect**.

At the two panel view the left side shows the local PC and the right side the connected device. You can exchange files per simple drag and drop or usage of the arrow buttons at the space between the two panels.



Click the **Disconnect** button to end the connection to the device.

isiFTP

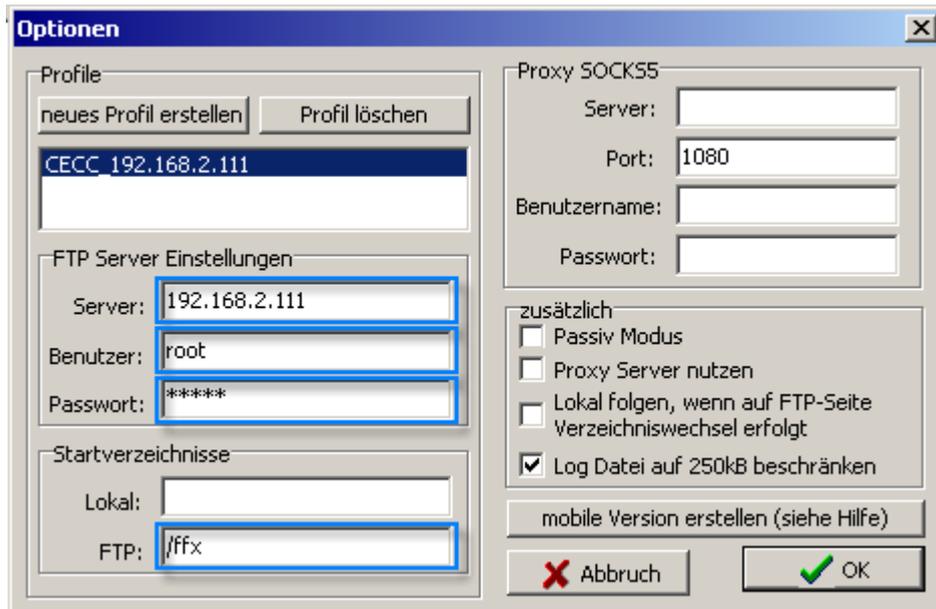
The FTP client "isiFTP" is freeware and can be downloaded at the following address:

<http://www.pcfreunde.de/download/d14726/isiftp/>

This program is available in German language ONLY.

The following setup is for a PLC device with IP 192.168.2.111.

After the menu item [Programme][Optionen] has been selected, the following dialogue box appears in which any number of connection profiles can be created.



The IP address of the PLC device is entered in the field "Server:".

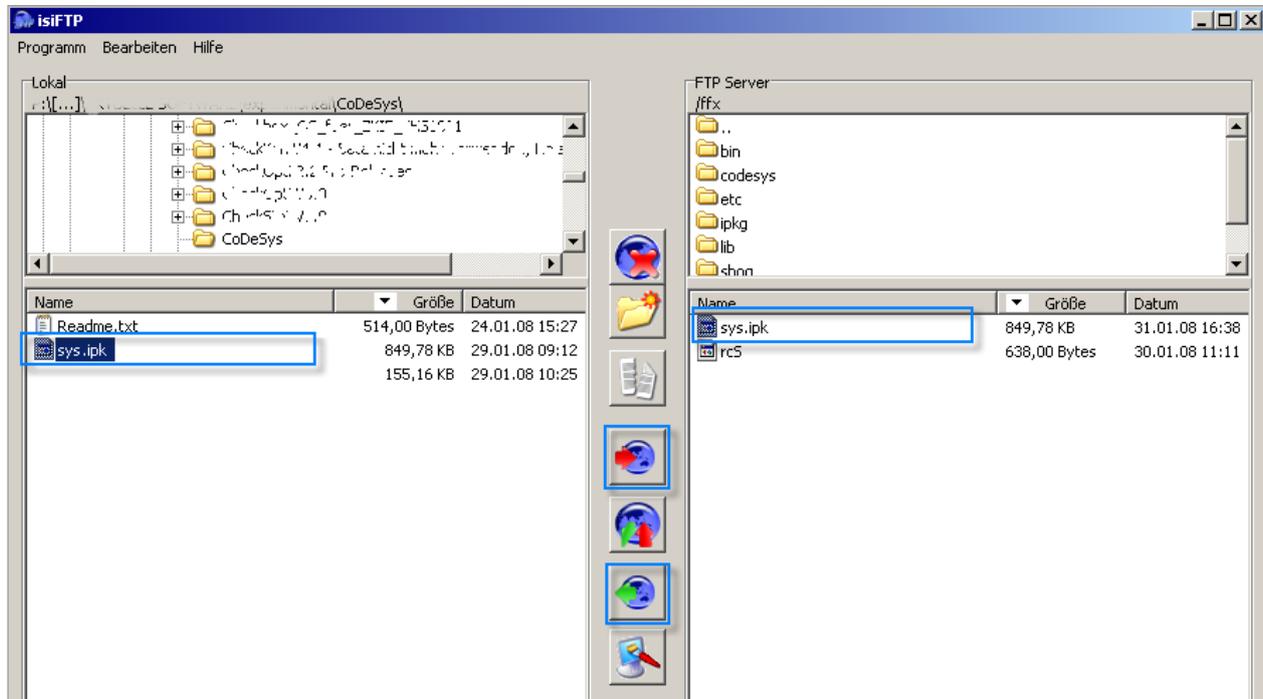
At the field "Benutzer:" enter "root", as no other user has been created on the device so far.

The field "Passwort:" should actually be self-explanatory.

In the fields "Startverzeichnisse / Lokal:" and "Startverzeichnisse / FTP:", those directories can be specified which are to be changed to on the PC and on the PLC device, as soon as the FTP connection has been established.

In the menu [Bearbeiten][FTP Profile ▶][<Profilname>] a corresponding profile can be selected.

The connection is established by selecting the menu [Bearbeiten][Verbinden] or clicking on the button between the two directory structures.



Now, as in Explorer, a corresponding directory can be selected on both devices.

If a file is selected, it can be transferred by clicking on the button with the arrow pointed towards the other device connected. This method works in both directions.



Note

Unlike with the TFTP transfer, if the FTP client is used the connection between device and PC continues to be sustained (depending on the configuration of the FTP client). If the connection is no longer required, it should be cut off manually.

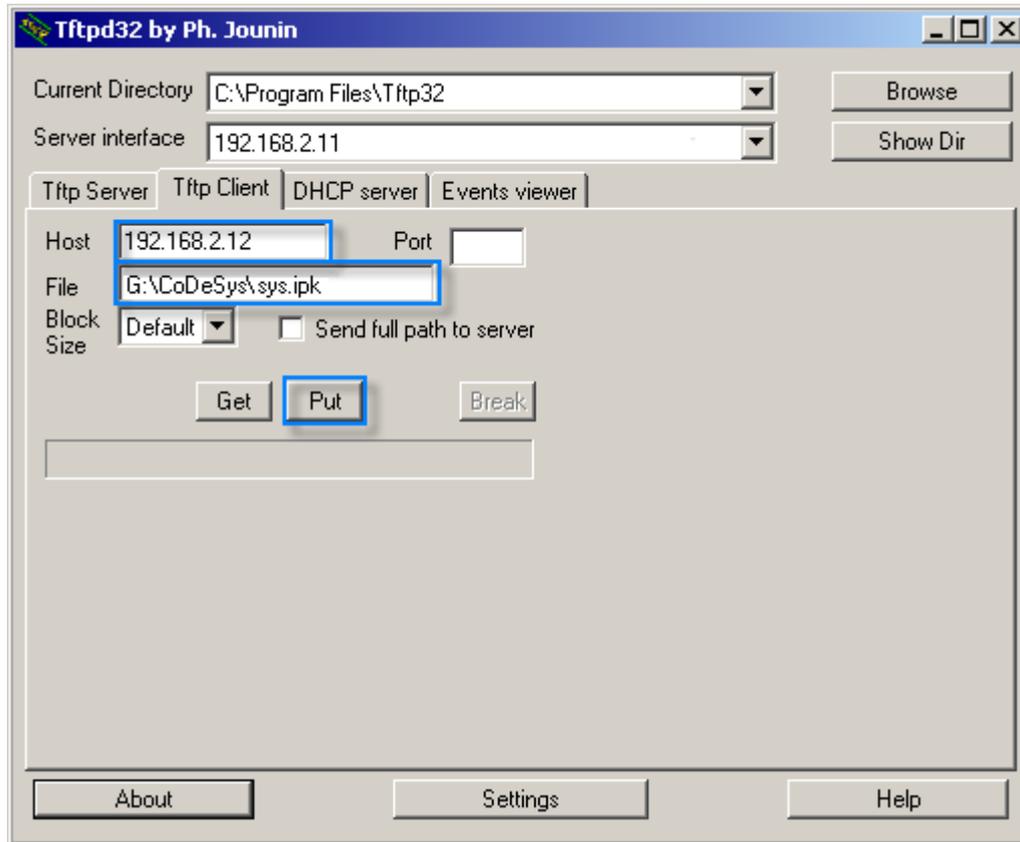
3.3.2 TFTP clients

Tftpd32

Tftpd32 is freeware and available for download at the following address:
<http://tftpd32.jounin.net/tftpd32.html>

The following setup is for a PC with IP address 192.168.2.11 and a PLC device with IP 192.168.2.12.

Change to the register "Tftp Client"



The field "Host" contains the IP address of the PLC device.

Enter the name of the file to be transferred in the input field "File".

In contrast to → PumpKIN, the file cannot be selected by a mouse click. Here, the filename including the path must be entered.

A click on the "Put" button transfers the file into the directory specified by using the start command for the tftp server (→ TFTP server).

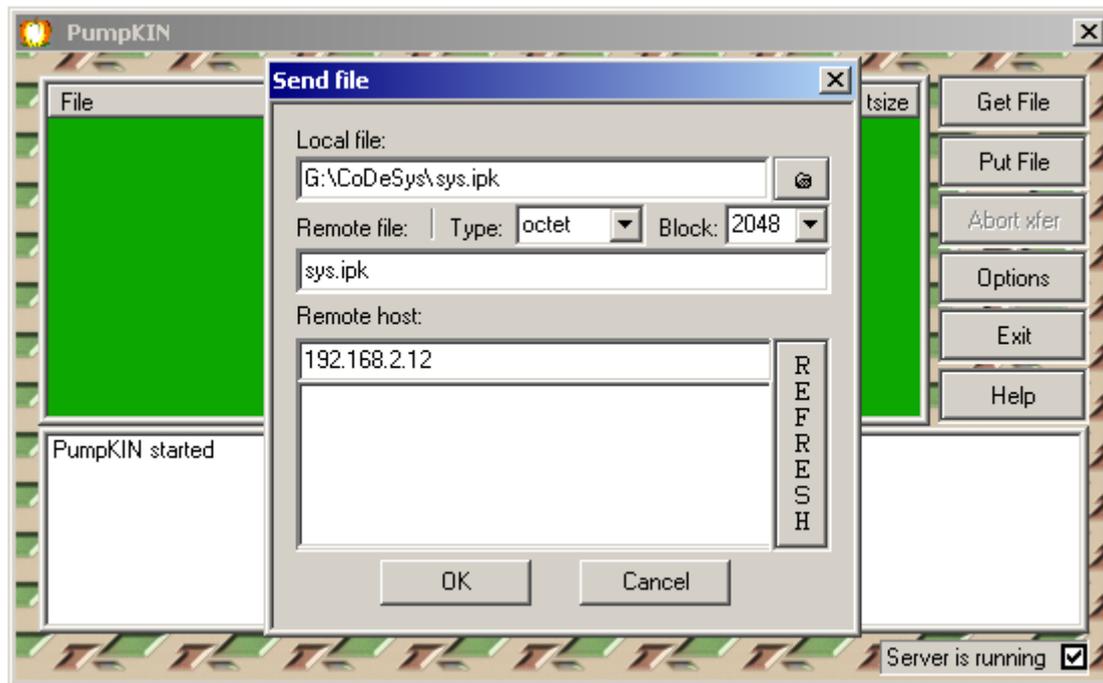
PumpKIN

PumpKIN is an Open Source software and is available for download, at the following address:
<http://kin.klever.net/pumpkin/>

The following setup is for a PLC device with IP address 192.168.2.12.

Push the button "Put File" to send a file to the PLC device.

Start FTP/TFTP server of the device



Enter the name of the file to be transferred in the input field "Local file". Alternatively, the button to the right of the input field can be used to search the desired file.
The field "Remote host:" contains the IP address of the PLC device.

If the dialogue box is confirmed with "OK", the file will be transferred into the directory specified by using the start command for the TFTP server (→ TFTP server).

4 Stop FTP/TFTP server of the device

If you don't need the server any more you should turn it off because it wastes system resources.

Therefore you can use several linux commands in the telnet terminal (you may need to establish a telnet connection to the device if not already existing according to → Step one – Establish telnet connection to device).

4.1 Stop FTP server of the device

Stop the FTP server on the device entering the following command finishing with **Enter**:
`stopftp`

If the command is not supported from the device use:

`killall vsftpd`

To check whether the FTP server is really stopped use the command

`ps`

The FTP server is stopped if no line with the character sequence `/vsftpd` appears in the process list.

4.2 Stop TFTP server of the device

Stop the TFTP server on the device entering the following command finished with **Enter**:
`stoptftp`

To check whether the TFTP server is really stopped use the command

`ps`

The TFTP server is stopped if no line with the character sequence `/tftpd` appears in the process list.



Note

The TFTP server is only supported from the CECC-... .

Start server automatically on every power up

5 Start server automatically on every power up

To start the TFTP/FTP server every time the device is powered up, you have to add a start-up script file to the device.

To do that, open or create the file **startup.txt** with your favourite editor. Edit the file as shown below.



Note

The end of line in the "startup.txt" file has to be a "LF" (linux style) not a "CRLF".

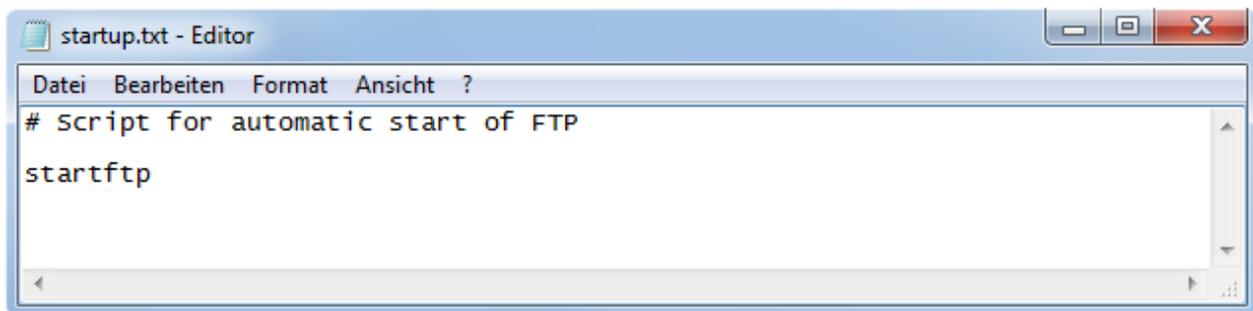


Note

The behaviour of processing the "startup.txt" is different for the CECC and CPX.

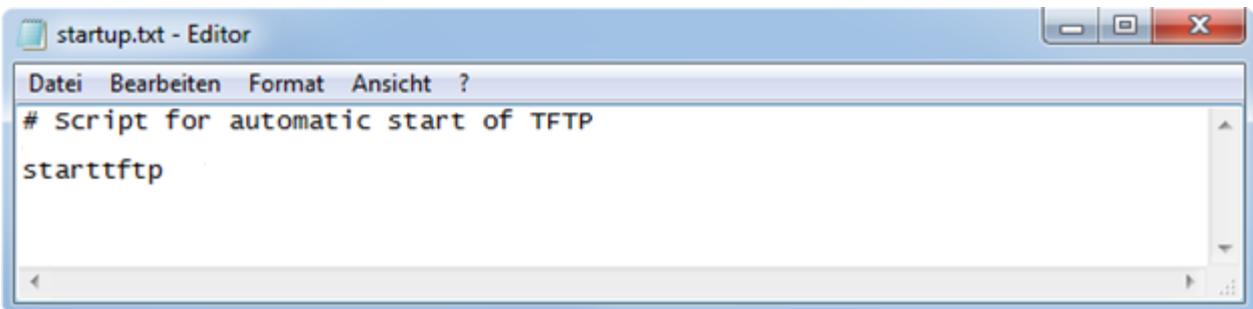
On the CPX-CEC-...-V3 the startup-script is processed **AFTER** starting the CODESYS runtime and on CECC devices it is processed **BEFORE**.

FTP Server



```
startup.txt - Editor
Datei Bearbeiten Format Ansicht ?
# Script for automatic start of FTP
startftp
```

TFTP Server



```
startup.txt - Editor
Datei Bearbeiten Format Ansicht ?
# Script for automatic start of TFTP
starttftp
```

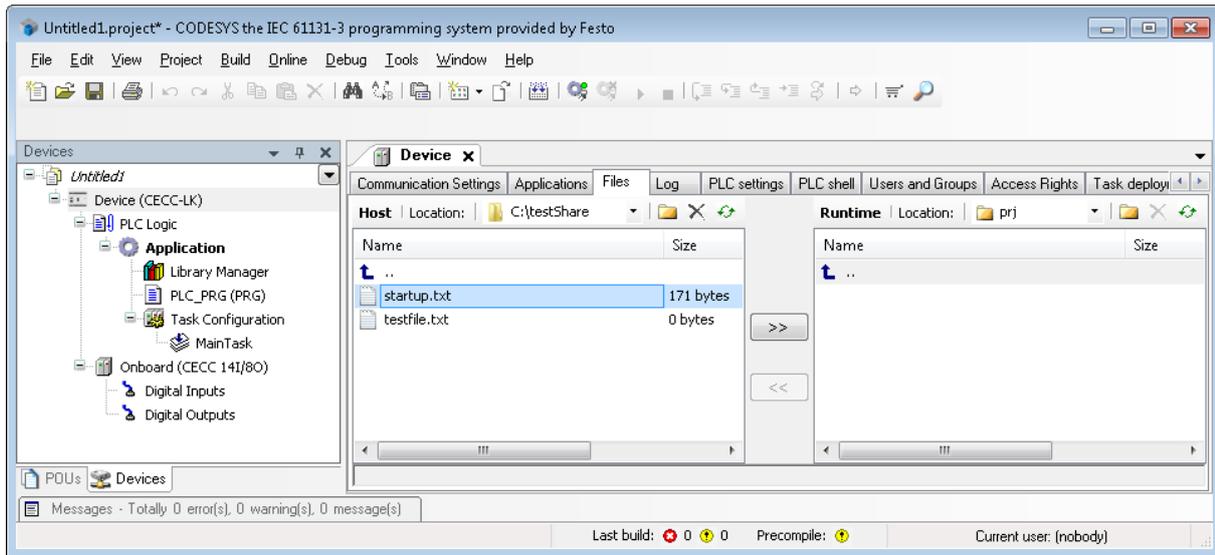
Transfer startup.txt to the PLC

Copy the startup script file **startup.txt** to your PLC. It is recommended to do that with CODESYS.

1. Click on the PLC node in the project tree on the left.

Select the PLC in the tab "Communication Settings".

2. Select the "Files" tab.
3. Connect to the PLC and open the prj/ subfolder.
4. Copy/Transfer the file **startup.txt** from your PC to the PLC.



After transfer you have to reboot the device.

6 Completely remove automatic start of the FTP/TFTP Server

6.1 Via CODESYS register "Files"

- Click on the PLC node in the project tree on the left
- Select the "Files" tab
- Connect to the PLC and open the prj/ subfolder
- Remove the file startup.txt
- Reboot the device

6.2 Via telnet

- Login via telnet to your device
- Following commands are used to delete the startup.txt file
`rm -f /ffx/codesys/prj/startup.txt`
`sync`
- To check if the file was deleted just enter the following command
`ls -al /ffx/codesys/prj`
- There should be no file listed with "startup.txt"
- Reboot the device