

Industriefunkuhren



Installer Manual

NTP package

ENGLISH

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1 General information about the hopf NTP package

The **hopf** NTP package is suitable for the following Windows 64 bit operating systems:

- Windows 7 / 8 / 8.1 / 10
- Server 2012 / 2012R2 / 2016

It can be downloaded in the download area of the **hopf** homepage (www.hopf.com).

The package includes a NTP client software for synchronization of the PC and provides a NTP Time Server function for other NTP clients which are connected to the PC.

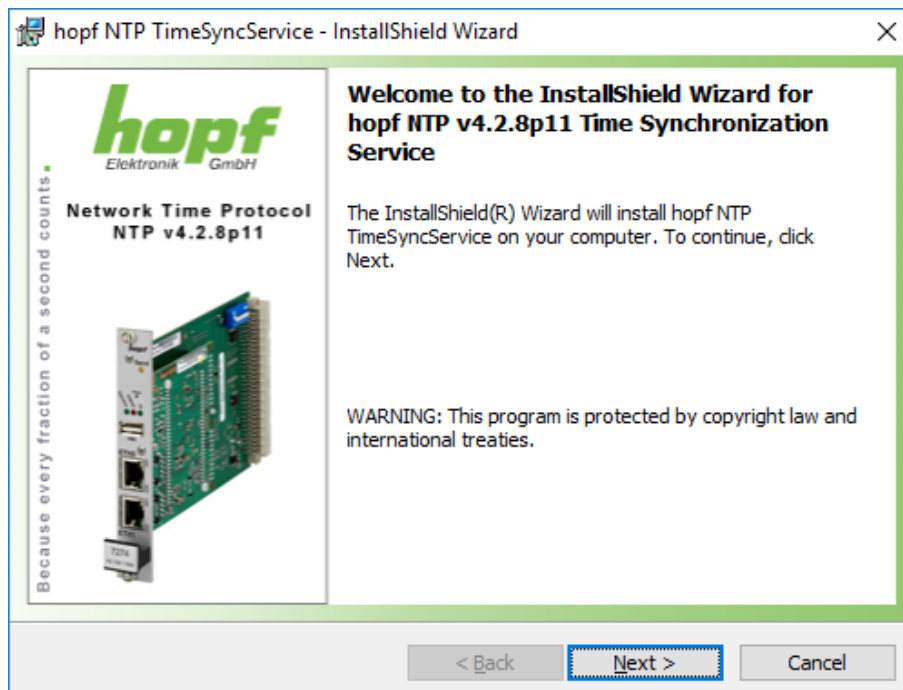
The NTP client software can be configured for synchronization via one of the following time sources:

- Protocol for NTP/SNTP via TCP/IP (e.g. from hopf GPS Time Server 8029/8030/7273/7274)
- Serial data string hopf Standard String (6021)
- Serial data string hopf Binary String without PPS pulse
- Serial data string hopf Binary String with PPS pulse

2 Installing and enabling **hopf** NTP Time Synchronization Service

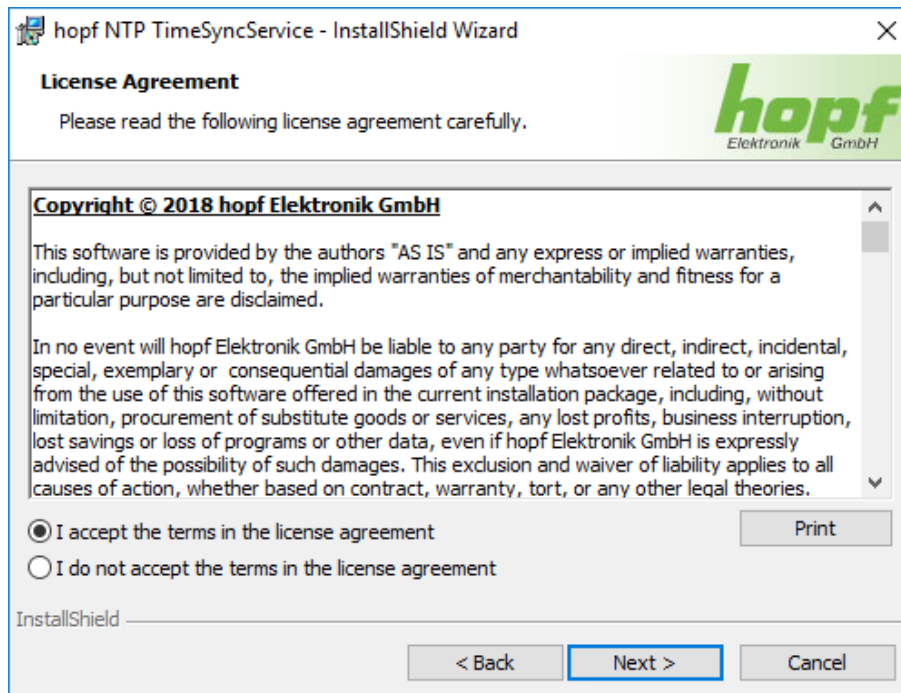
To install the **hopf** NTP Time Synchronization Service just start the exe-file "hopf_NTP-TimeSyncServiceSetup.exe" with administrator privileges and follow the guided installation process.

When the exe-file is started, the following window is shown:



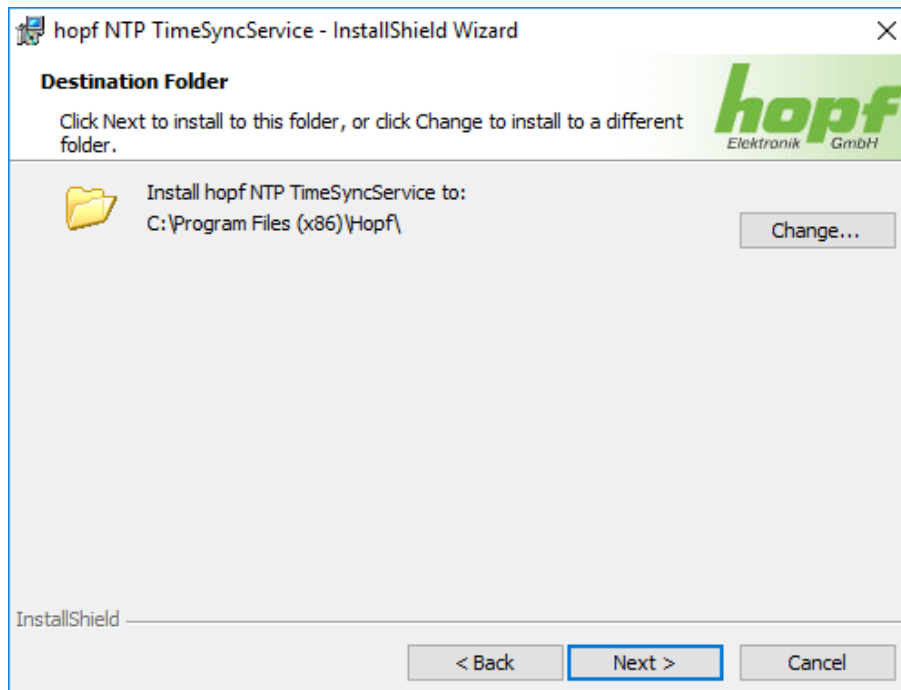
Click on button "Next" to start the installation process.

In order to install the synchronization service on your system please agree to the terms of condition.



Click on button "Next" to select the directory path where you would like to install the synchronization service. The default path is set to "C:\Program Files (x86)\Hopf\".

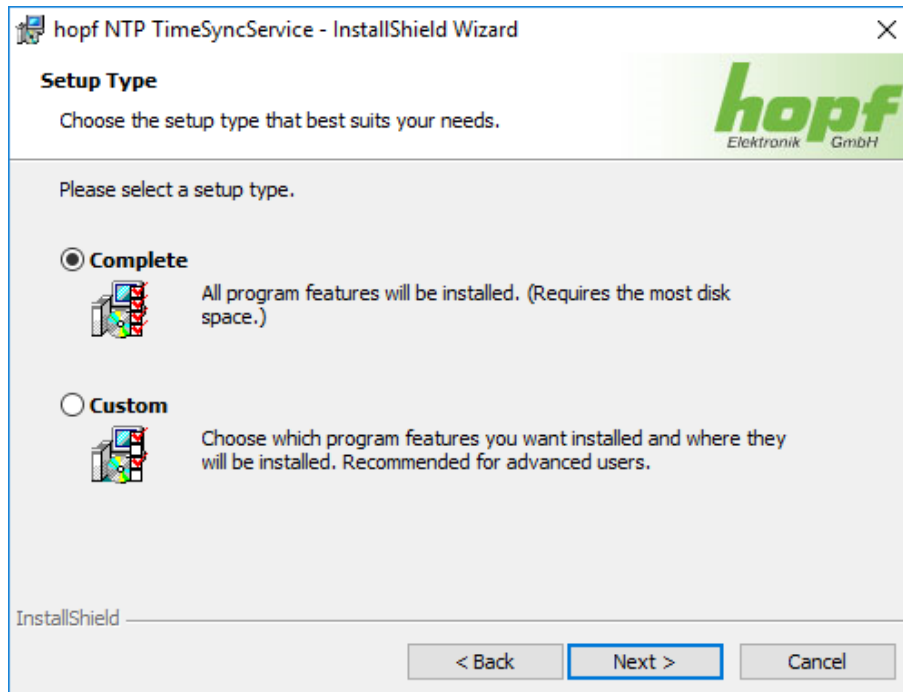
We highly recommend to use the default directory!



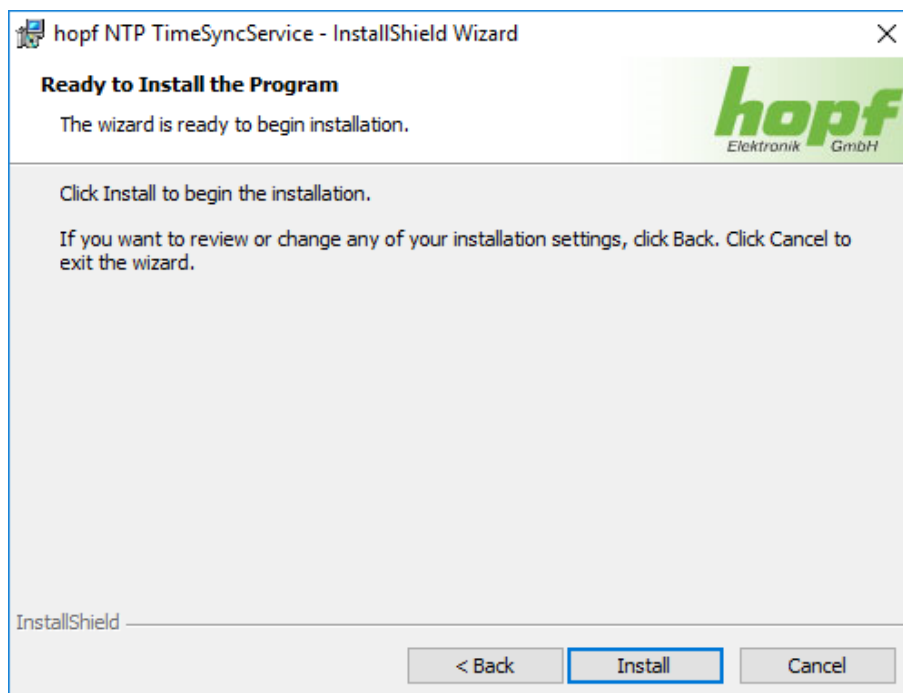
Click on button "Next"

The next step allows you either to install the full NTP package with all its features or to deselect individual components. It's highly recommended to install the full package since all components are needed in order to run the NTP synchronization service on your PC and to ensure that the latest component versions are used.

If you select to install the full NTP package, the following window is shown. Please click on button "Next" to go ahead.

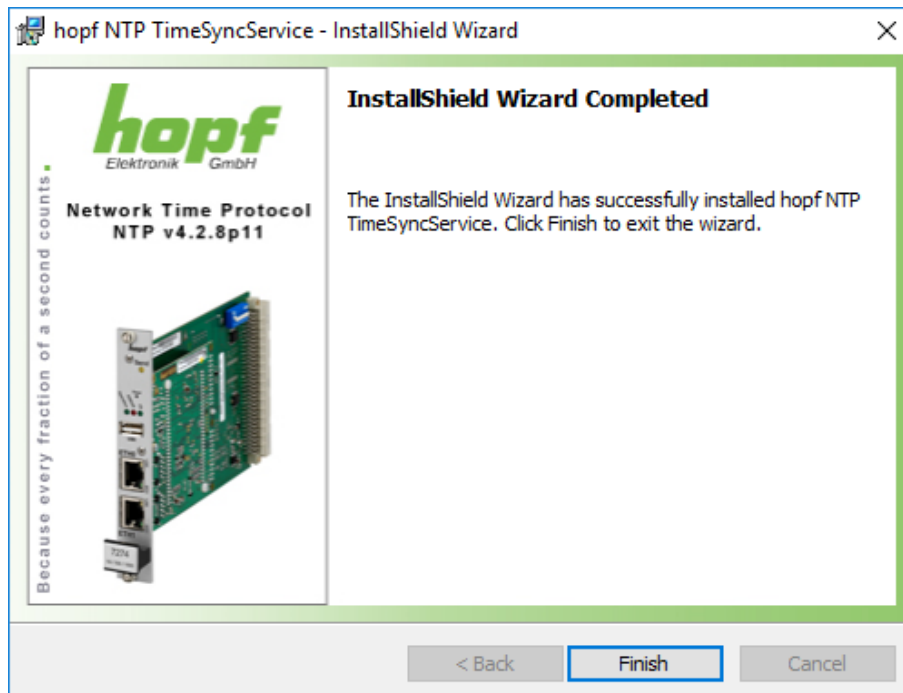


After setting all prerequisites the NTP Time Synchronization Service is ready to install.



Click on button "Install".

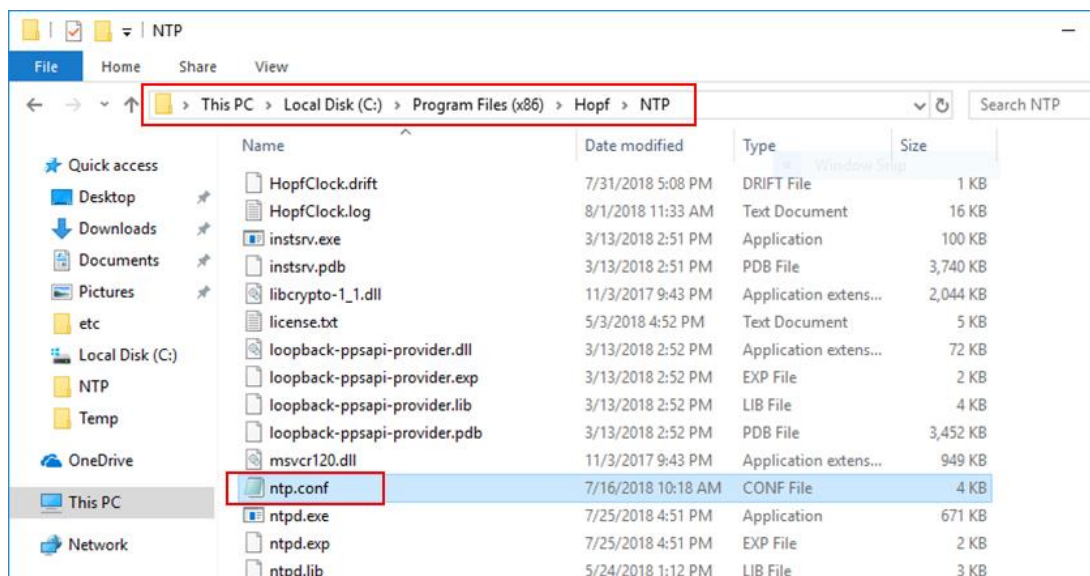
After successful installation the following window is shown:



After successful installation the configuration file of the NTP Time Sync Service has to be adapted to the time source that shall be used for synchronization. For this purpose the file **ntp.conf** has to be adapted.

Open the folder "C:\Program Files (x86)\Hopf\NTP".

The file **ntp.conf** is located in this folder. This file includes the configuration of the NTP Service for your specific use.



Open the file **ntp.conf** by use of a text editor.

3 Configuring the NTP config file

To adapt the **ntp.conf** file to your application, you have to activate the command lines which are referring to the used time source by deleting the **"#"** as first character of the line.

The IP addresses told in the command lines for synchronization via serial string are fixed addresses for the referring **hopf** reference clock and don't have to be changed. Only the **"X"** has to be replaced by the number of the used COM port of the PC.

Some examples:

1. If you are using the **hopf StandardString** (6021) as time string format on **COM port 2** the following lines should be set active:

```
server 127.127.38.2 prefer iburst minpoll 4 maxpoll 4 mode 0
fudge 127.127.38.2 flag1 1 flag2 0 flag3 0
```

2. If you are using the **hopf BinaryString** (without PPS) as time string format on **COM port 4** the following lines should be set active:

```
server 127.127.38.4 prefer iburst minpoll 4 maxpoll 4 mode 1
fudge 127.127.38.4 flag1 1 flag2 0 flag3 0
```

3. If you are using the **hopf BinaryString with PPS** as time string format on **COM port 6** and want to listen on the **ASSERT edge** of the PPS line, the following lines should be set active:

```
server 127.127.38.6 prefer iburst minpoll 4 maxpoll 4 mode 2
fudge 127.127.38.6 flag1 1 flag2 0 flag3 0
```

4. If you are using the **hopf BinaryString with PPS** as time string format on **COM port 7** and want to listen on the **CLEAR edge** of the PPS line, the following lines should be set active:

```
server 127.127.38.7 prefer iburst minpoll 4 maxpoll 4 mode 2
fudge 127.127.38.7 flag1 1 flag2 1 flag3 0
```

Meaning of the flags:

Flag	Possible values and description
flag1	0: the clock will not sync without a valid radio signal. 1: the clock will sync even without radio operation.
flag2	0: when using a PPS line the driver will listen on the assert (rising) edge of the PPS signal. 1: the NTP driver will sync on the clear (falling) edge of the PPS signal.
flag3	0: time_pps_kcbind: If kernel PPS processing is supported, this binds the support to the associated PPS interface instance. This feature is not available on Windows systems!

Furthermore, it is also possible to configure additional (external) time server for redundancy reasons as well as to achieve a higher synchronization precision. Let's assume your NTP time server has the IP address 192.168.100.100 – in this case you can easily append the line

```
server 192.168.100.100 minpoll 4 maxpoll 4
```

to the NTP configuration file.

The NTP configuration file also supports the use of domain names instead of decided IP addresses. So, if you would like to use a public time server for instance, you are free to append the common domain name like:

```
server timeserver.eu minpoll 4 maxpoll 4
```

Description of the key words:

- The **server** key word mobilizes a persistent client mode association with the specified remote server or local radio clock.
- The address **127.127.38.X** refers to a serial **hopf** reference clock which is connected to the COM X port of the PC. Instead of the "X" the used COM port of the PC has to be set.
- The **prefer** key word marks the server as preferred. All other things being equal, this host will be chosen for synchronization among a set of correctly operating hosts.
- When the server is unreachable, a burst of eight packets instead of the usual one will be send by using the **iburst** parameter.
- The **minpoll** and **maxpoll** options specify the minimum and maximum poll intervals for NTP messages, as a power of 2 in seconds. As a standard it is not required to change the pre-settings minpoll 4 and maxpoll 4.
- The **mode** parameter allows you to define which time string format you are using. If this parameter is not used mode 0 will be set automatically. Supported modes are as follows:

Mode	Description
0	Reading Hopf Standard (6021) String.
1	Reading Hopf Binary String.
2	Reading Hopf Binary String with a PPS line.

3.1 Additional settings

The fudge parameter allows you to set certain properties of a given time source. For example

```
fudge 127.127.38.0 flag1 1 flag2 0 flag3 0
```

means that the **hopf** reference clock on COM port 0 will synchronize even without radio operation and listens on the assert (rising) edge of the PPS signal. Please find the detailed flag descriptions below:

Flag	Possible values and description
flag1	0: the clock will not sync without a valid radio signal. 1: the clock will sync even without radio operation.
flag2	0: when using a PPS line the driver will listen on the assert (rising) edge of the PPS signal. 1: the NTP driver will sync on the clear (falling) edge of the PPS signal.
flag3	0: time_pps_kcblind: If kernel PPS processing is supported, this binds the support to the associated PPS interface instance. This feature is not available on Windows systems!

3.2 Statistics

The default path of the statistic files is equal to the default install directory (which is "*C:\Program Files (x86)\Hopf\NTP*"). Please update these paths if you have changed the default installation directory accordingly. Per default a log and a drift file are enabled to monitor the synchronization process. However, you might en- or disable additional logging services according to your needs. Check for suggested logging commands within the configuration file or the official NTP configuration file documentation for further monitoring options.

3.3 Access Control Support

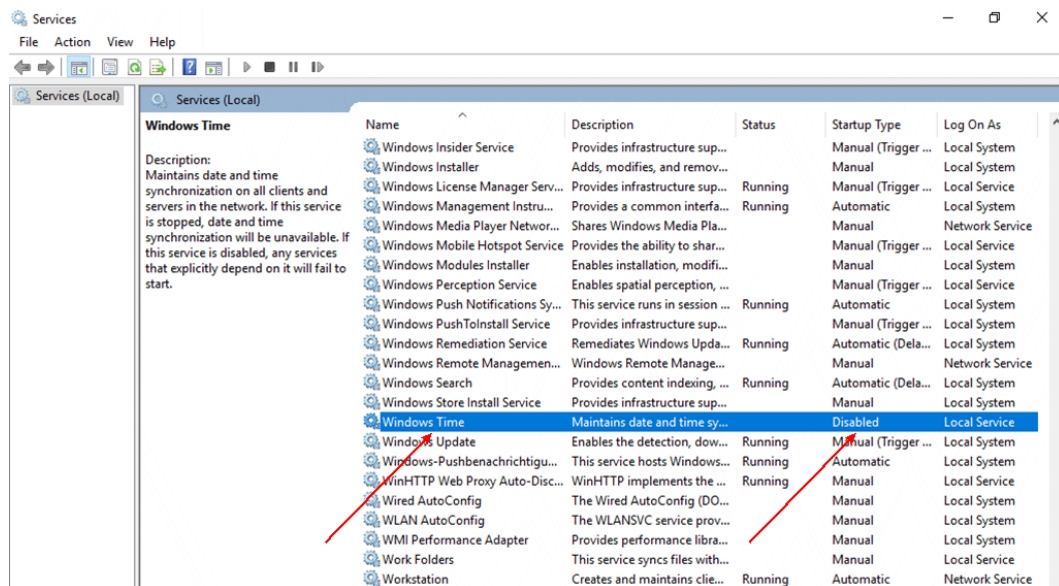
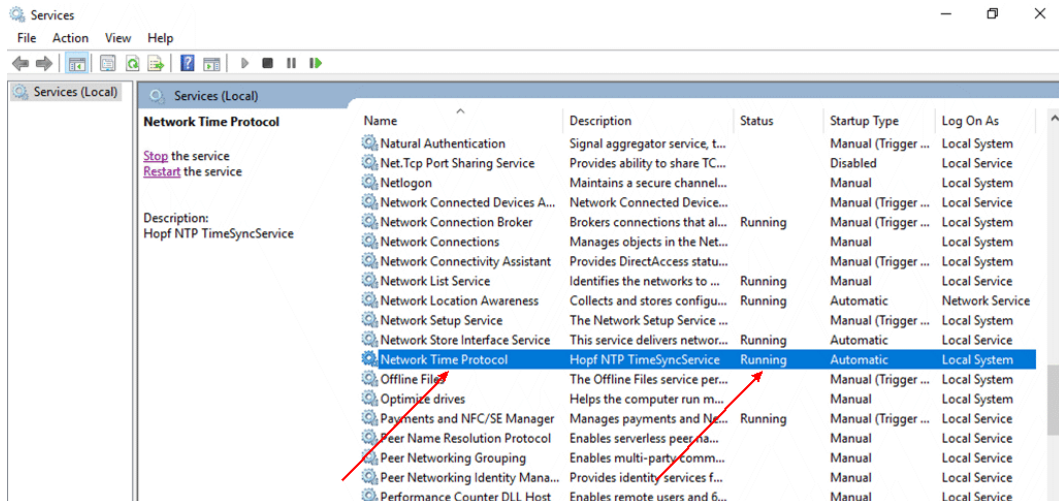
Using the **restrict** key word allows you to block undesired requests and queries. Several additional parameters enable you to define what kind of services or requests should be blocked. The **nomodify** parameter denies ntpq and ntpdc queries which attempt to modify the state of the server. Further information and parameters about this feature can be find in the official NTP configuration file documentation.

3.4 Moreover

For further information and configuration options please check for the official NTP configuration file documentation (www.ntp.org)

After you have adapted the `ntp.conf` file to your application and stored the changes in the `ntp.conf` file:

- Make sure that no other time service beside the **hopf** NTP Time Sync Service is active. The service will be shown as "Network Time Protocol" service in the Windows service manager. The Windows Time Server (e.g. W32time, Windows Time) or any other time service beside NTP has to be deactivated.



- Make sure that the Windows setting of PC is set to correct time zone and automatic switch-over to daylight saving time (if used at site) is activated in the PC.
- Check the settings and the sync. status of the used reference clock (please see the following clock configuration information):

4 Clock configurations

For best syncing results please configure your clock device as follows:

4.1 Configuring for *hopf* Standard String (6021) [mode 0]

Parameter	Setting
COM Port	9600 @ 8N1
Time Base	UTC
Send scheme	At once with second forerun, ETX at second change
Send cycle	Every second
Control characters	Send with <STX><ETX>, <CR><LF>

4.2 Configuring for hopf Binary String without PPS [mode 1]

Parameter	Setting
COM Port	9600 @ 8N1
Time Base	UTC
Send scheme	With delay with second forerun, ETX at second change
Send cycle	Every second
Control characters	Send with <STX><ETX>, <CR><LF>

4.3 Configuring for hopf Binary String with PPS [mode 2]

Parameter	Setting
COM Port	9600 @ 8N1
Time Base	UTC
Send scheme	At once (without forerun)
Send cycle	Every second
Control characters	Send with <STX><ETX>, <CR><LF>

4.4 Configuring for protocol for NTP/SNTP (RFC 5905) via TCP/IP

Parameter	Setting
Port	NTP/SNTP LAN port of NTP Time Server
Time Base	UTC
Protocol	Protocol for NTP/SNTP (RFC 5905) has to be enabled
LAN setting of port	It has to be ensured that the NTP client can reach the LAN port of the NTP Time Server in the network

Restart your PC to make sure that the changes in the `ntp.conf` file will be considered in the *hopf* NTP Time Sync Service.



PLEASE NOTE: When the *hopf* NTP Time Sync Service is started the first time it will set the time of the PC hard!
After that the time will be set smoothly without time gaps.

5 Verifying the NTP service

To check whether the NTP service is running properly you can use the NTPQ tool which is available in your installation directory (per default this is "C:\Program Files (x86)\Hopf\NTP"). Please open a command shell with administrator rights within your installation directory (search for "cmd" within your Window start menu and change the path to your installation directory by using the "cd" command). Entering the following command line allows you to check the present state of the NTP service and its peers:

```
.\ntpq.exe -pn
```

If the service is running correctly you should see a similar response like this:

```

remote          refid          st t when poll reach  delay  offset  jitter
=====
*127.127.38.1   .PPS.         0 1  1  16   1   0.000  0.137  0.027
    
```

Pay heed to the very first character of the line. If your peer is marked with a * or + your time synchronization service is running properly. Further status characters are described in the table below.

In case of an error you might see an output like this:

```
read: No such file or directory
```

In this case it is very likely that the NTP service did not start correctly. Please verify whether your settings within **ntp.conf** are correct (see chapter 'configuring the NTP config file') or try to restart your PC.

5.1 Interpreting the NTP state

The character in the left margin in the peers billboard, called the tally code, shows the fate of each association in the clock selection process. Following is a list of these characters and a short explanation of the condition revealed.

Character	Description
Space	The peer is discarded as unreachable, synchronized to this server (synch loop) or outrageous synchronization distance.
x	The peer is discarded by the intersection algorithm as a falseticker.
-	The peer is discarded by the clustering algorithm as an outlier.
+	The peer is a survivor and a candidate for the combining algorithm.
#	The peer is a survivor, but not among the first six peers sorted by synchronization distance. If the association is ephemeral, it may be demobilized to conserve resources.
*	The peer has been declared the system peer and lends its variables to the system variables.

The following table shows a description of the evaluated parameters:

Parameter	Description
remote	Defines the individual time source by its address.
refid	This value offers information of the signal type of the peer. For example, if the time signal is based on a PPS line, GPS signal or something similar.
st	The stratum of the peer.
t	Type of the peer (local, unicast, ...).
when	When the last packet was received.
poll	Polling interval in sec.
reach	Reachability register.
delay	Current estimated delay in ms.
offset	The offset of the peer in ms.
jitter	The dispersion of the peer in ms.

For further information and verification options please check for the official NTP documentation at (www.ntp.org)