UC20-SL2000-OLAC-EC

Quick Start Guide for using the NTP protocol with OLAC

Abstract:
The document shows how to set up a NTP server on a windows system and on a u-control SL2000. It shows further, how to set up a u-control SL2000 and a u-view HMI to connect to a NTP server. NTP(Network Time Protocol) is used to synchronize clocks of different devices through an IP based network. Therefore, it uses the port 123 of the UDP protocol.

Hardware reference

No.	Component name	Article No.	Hardware / Firmware version
1	UC20-SL2000-OLAC-EC	2638920000	HW 01.xx.xx

Software reference

No.	Software name	Article No.	Software version
1	WinSCP	-	5.19.x
2	PuTTY	-	0.75
3	u-create studio	2660130000	1.18a

File reference

No.	Name	Description	Version
1	-	-	-

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1 Warning and Disclaimer

Warning
Controls may fail in unsafe operating conditions, causing uncontrolled operation of the controlled devices. Such hazardous events can result in death and / or serious injury and / or property damage. Therefore, there must be safety equipment provided / electrical safety design or other redundant safety features that are independent from the automation system.

Disclaimer
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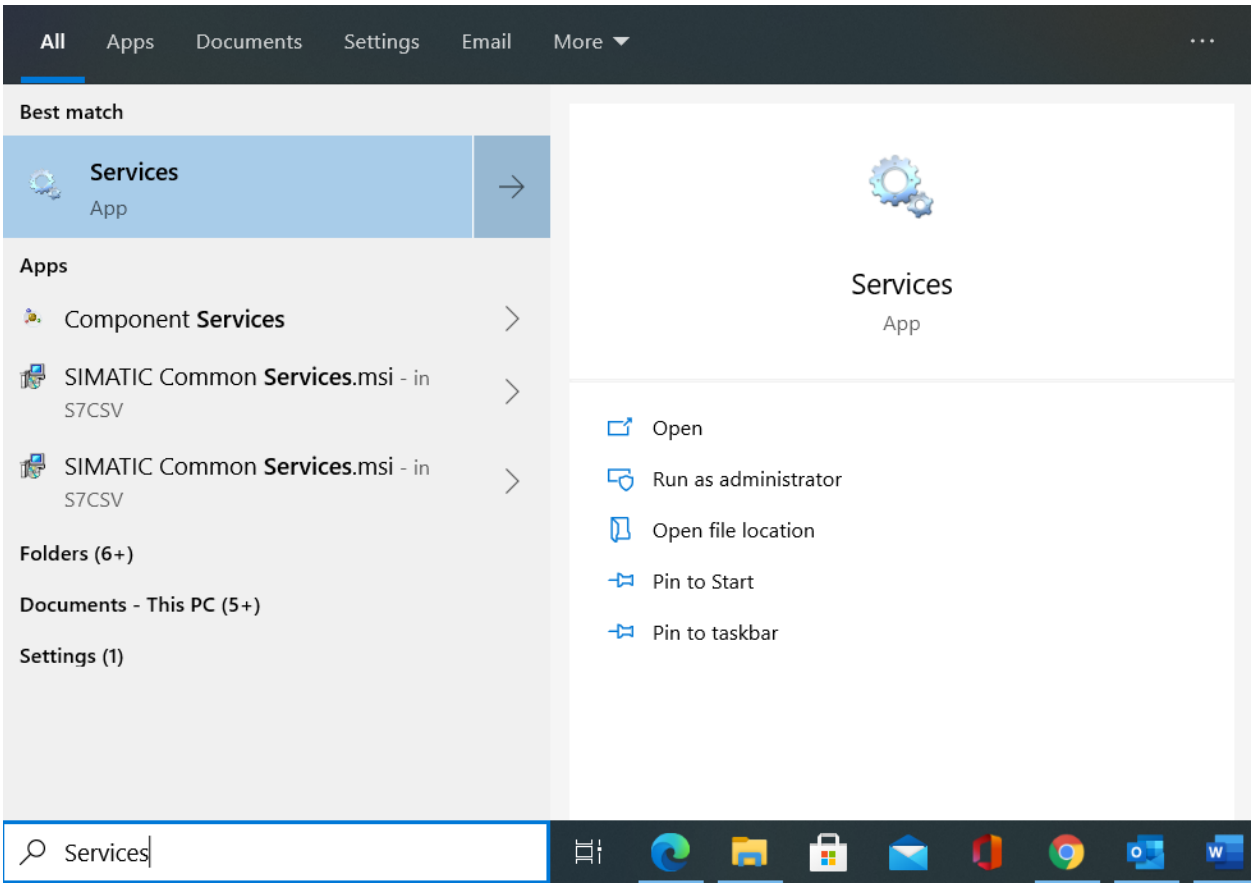
Security notes
In order to protect equipment, systems, machines and networks against cyber threats, it is necessary to implement (and maintain) a complete state-of-the-art industrial security concept. The customer is responsible for preventing unauthorized access to his equipment, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or the Internet if necessary and appropriate safeguards (such as firewalls and network segmentation) have been taken.

2 Using a Windows computer as NTP server

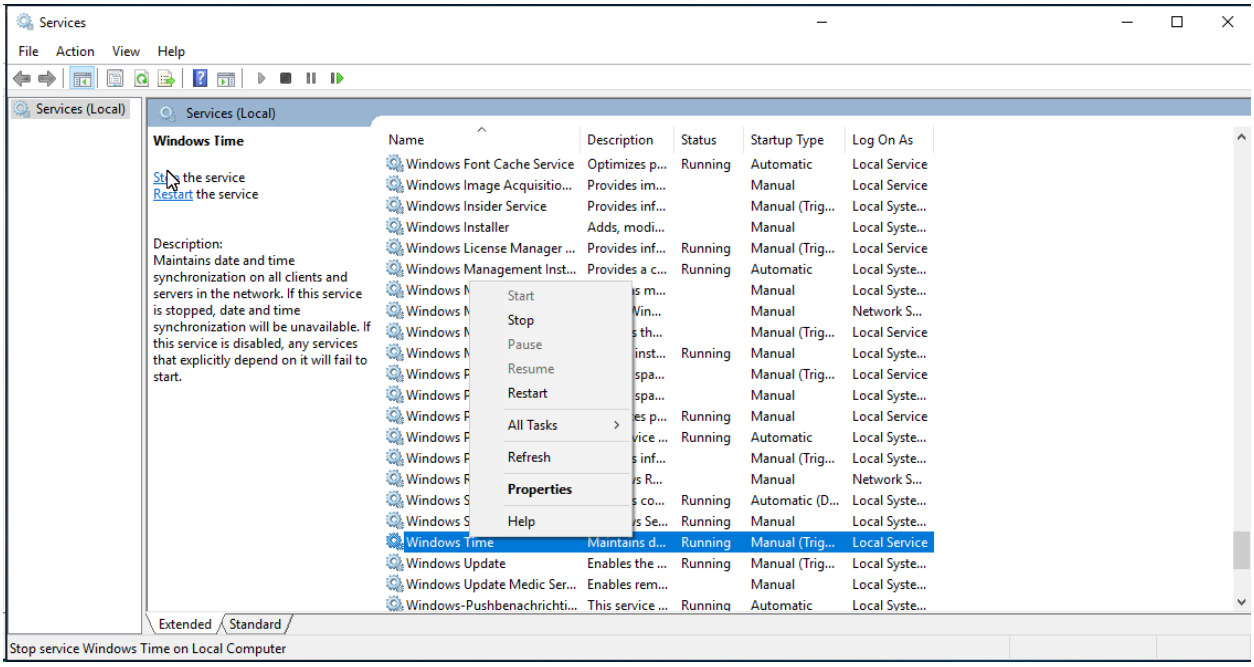
One use case is to setup a Windows PC to act as NTP sever and connect the controller and other devices to this server.

2.1 Setting up the Windows system

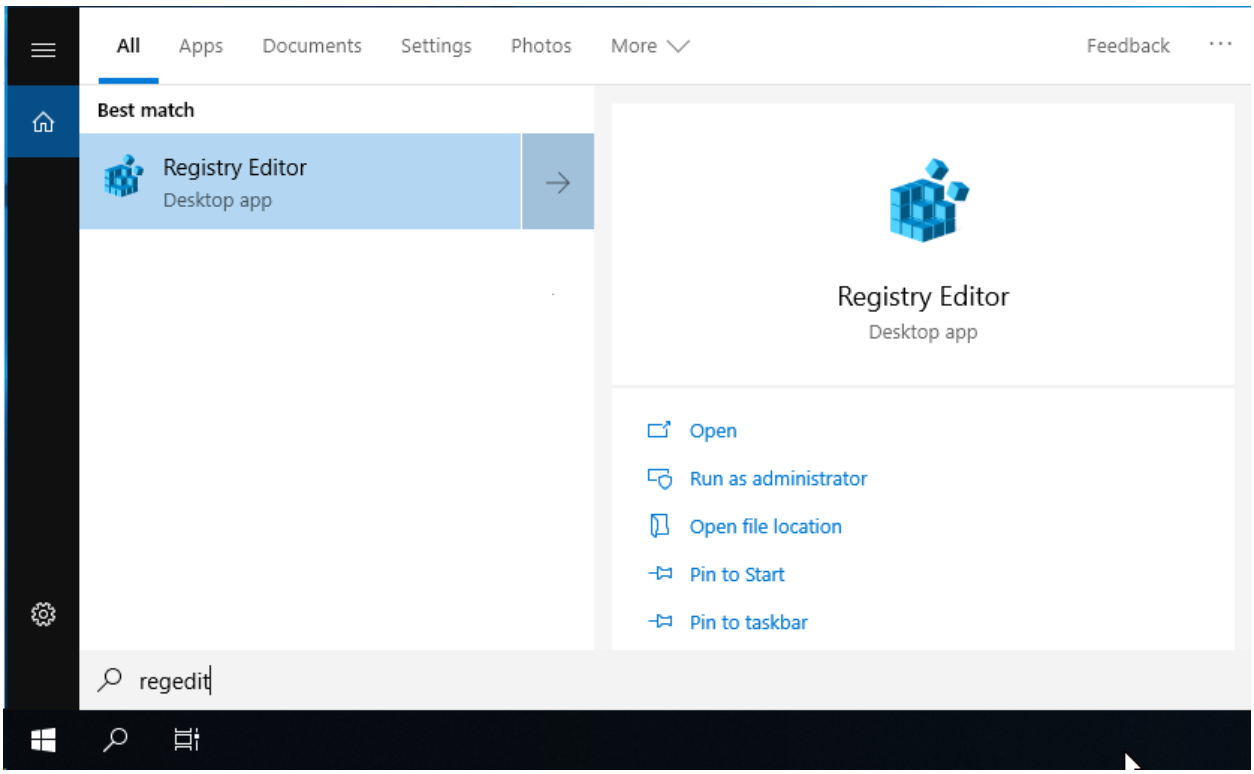
1.) Stop the service “Windows Time”. It is opened by typing “Services” in the search bar. This may differ if you use another Operating System.



2.) Right click on the service and select Stop to stop the Service.



3.) Once the setup has been stopped, there are some registry keys that needs to be changed. The registry editor is opened by typing regedit in the search bar.

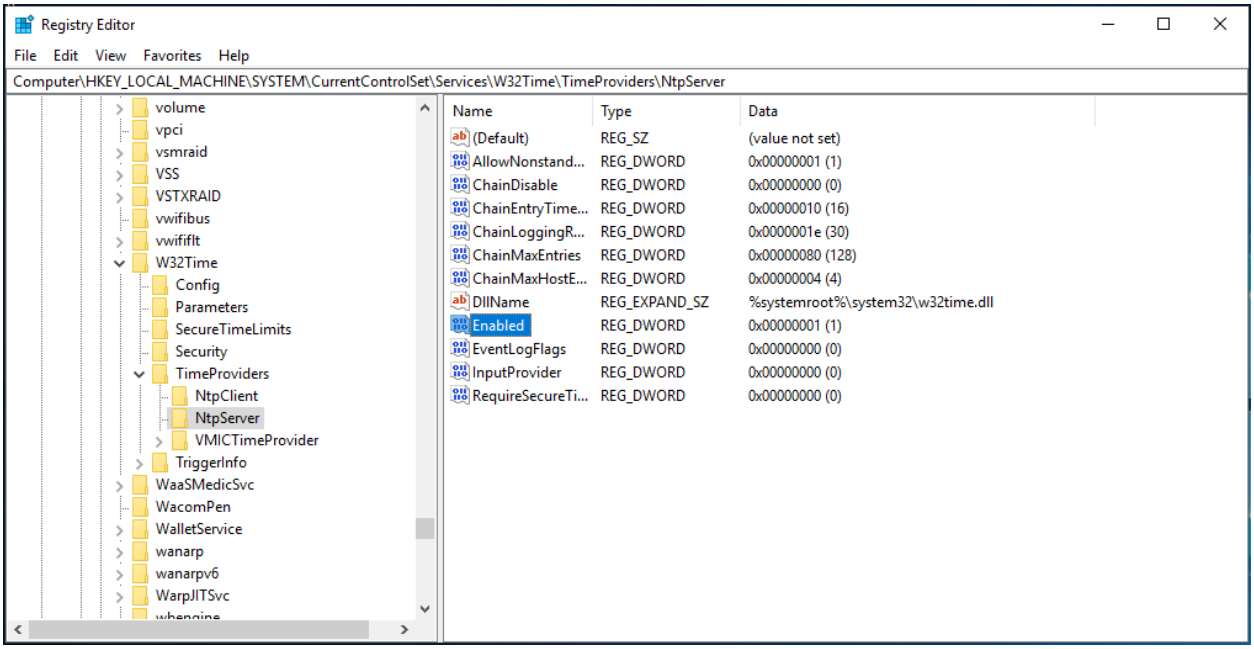


Warning: The registry editor is a very powerful tool and cause serious damage to the system. It must be used very carefully.

4.) To activate the NTP server two keys needs to be changed.

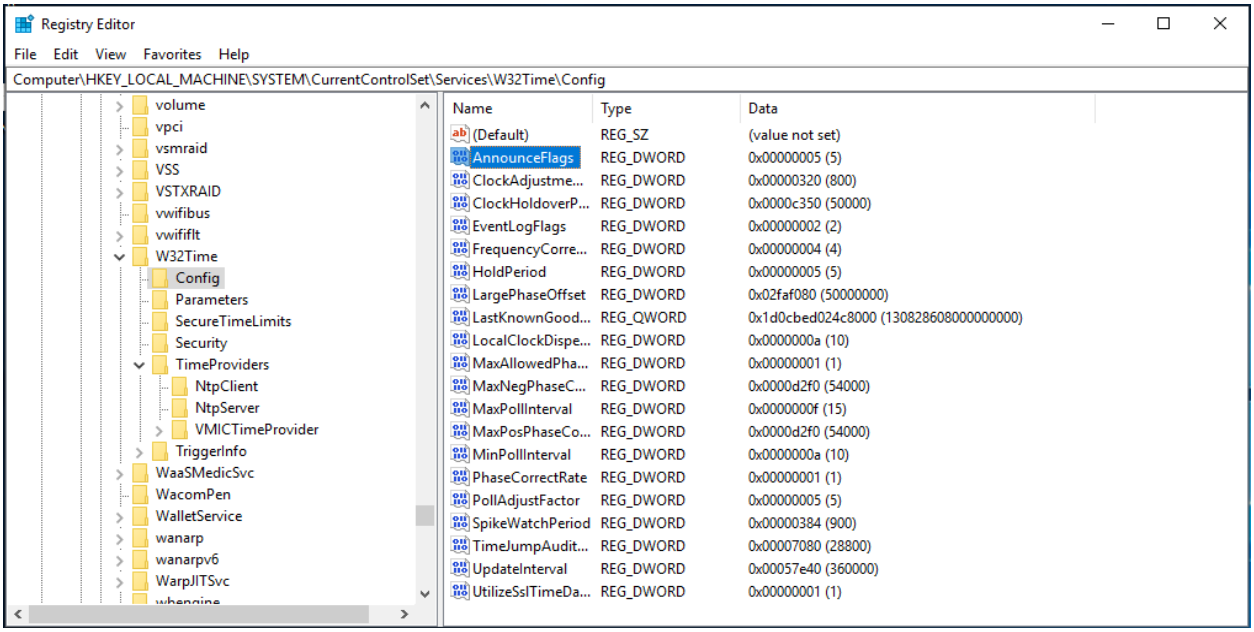
- Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\TimeProviders\NtpServer

The key `Enabled` needs to be set from 0 to 1.

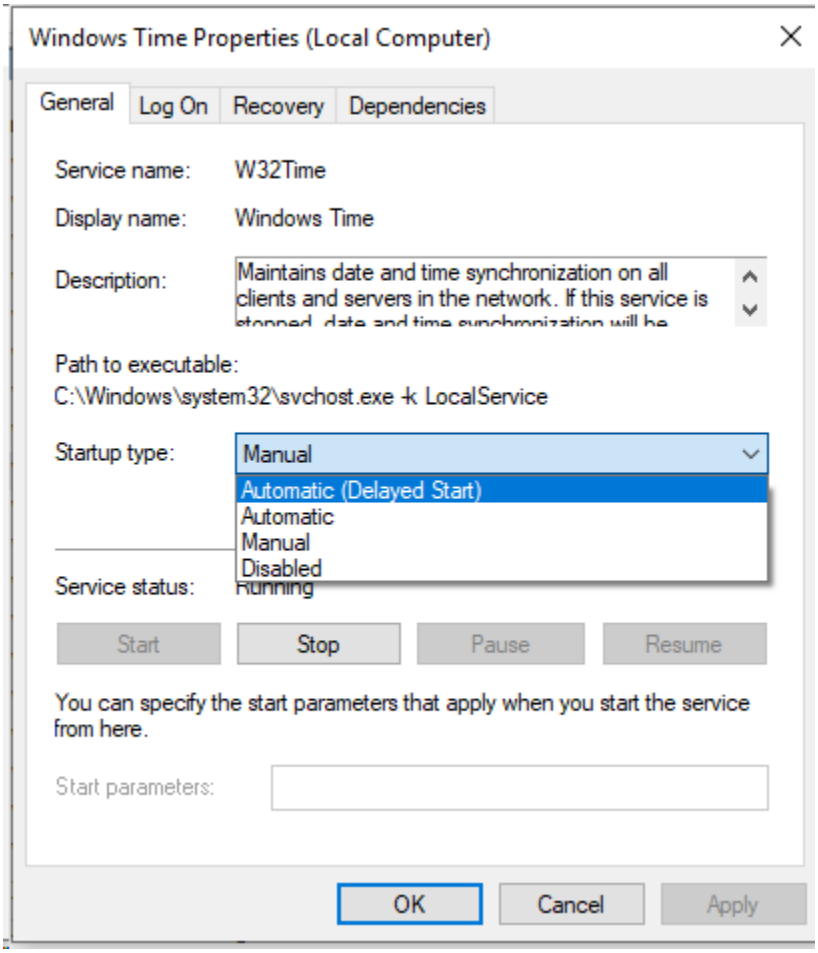


- Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\Config

The key `AnnounceFlags` needs to be set from 10 to 5.



5.) Once the keys are modified, the service “Windows Time” needs to be reactivated and set to auto start. This is done in the services menu by a double click to the service.



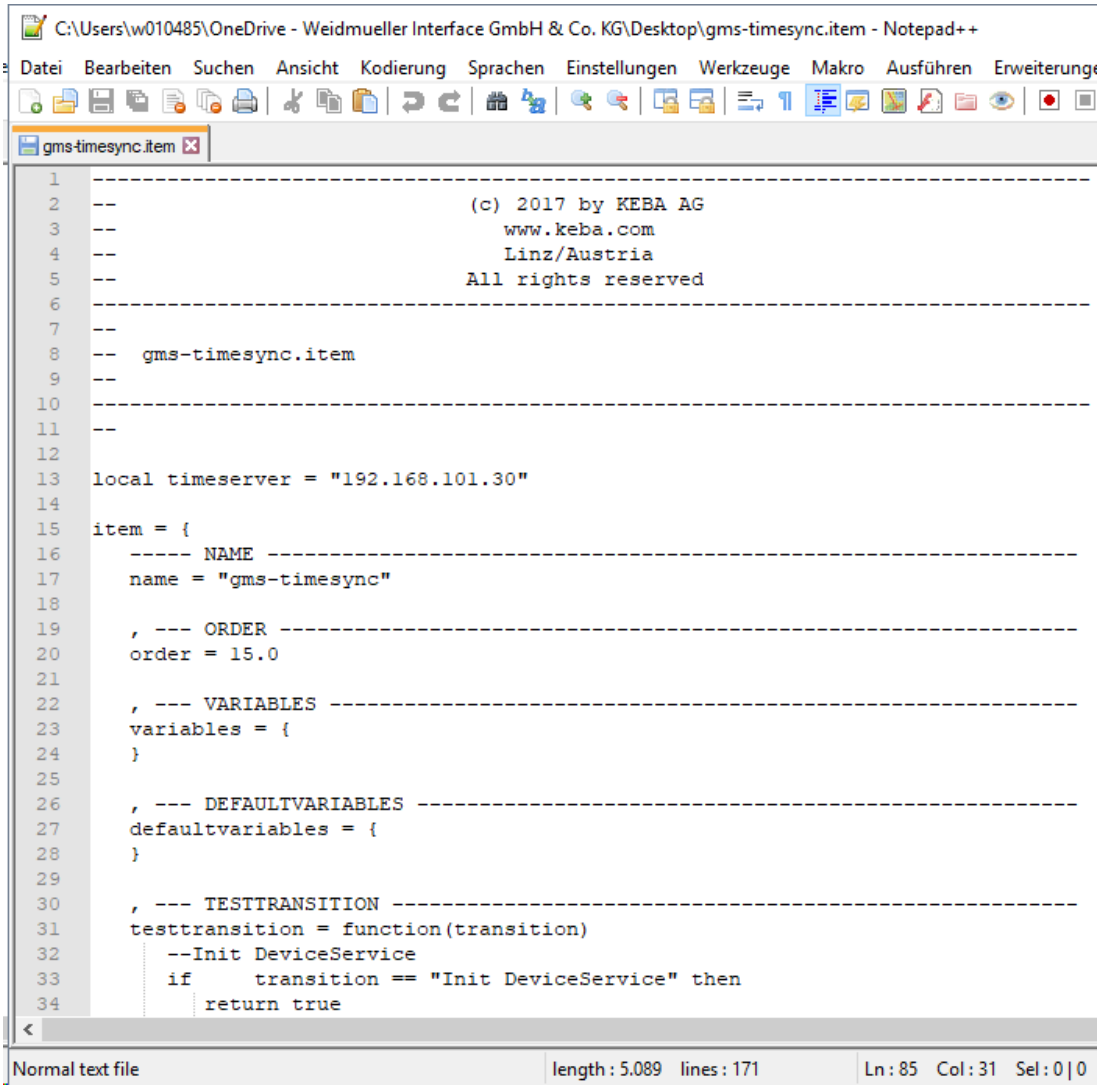
6.) Select the Startup type Automatic (Delayed Start).
7.) The last step is to open the Port UDP 123 on the PCs firewall.

There are different firewalls available on the market, this Quick Start Guide does not go into details on this topic.

2.2 Connecting the PLC to the NTP Server

The PLC can now act as an NTP client, to synchronize its local clock with the clock of the NTP server, in this scenario the Windows PC. This is done via the item file “**gms-timesync.item**”. The file requires a modification.

1.) The IP Address of the NTP server needs to be entered.



2.) Once the IP-Address of the NTP servers has been entered, the file needs to be copied to the controller, under the path: /opt/deviceservice/items.d.

The .item relies on **ntpdate**. This program reads the time from an NTP server and sets the system clock.

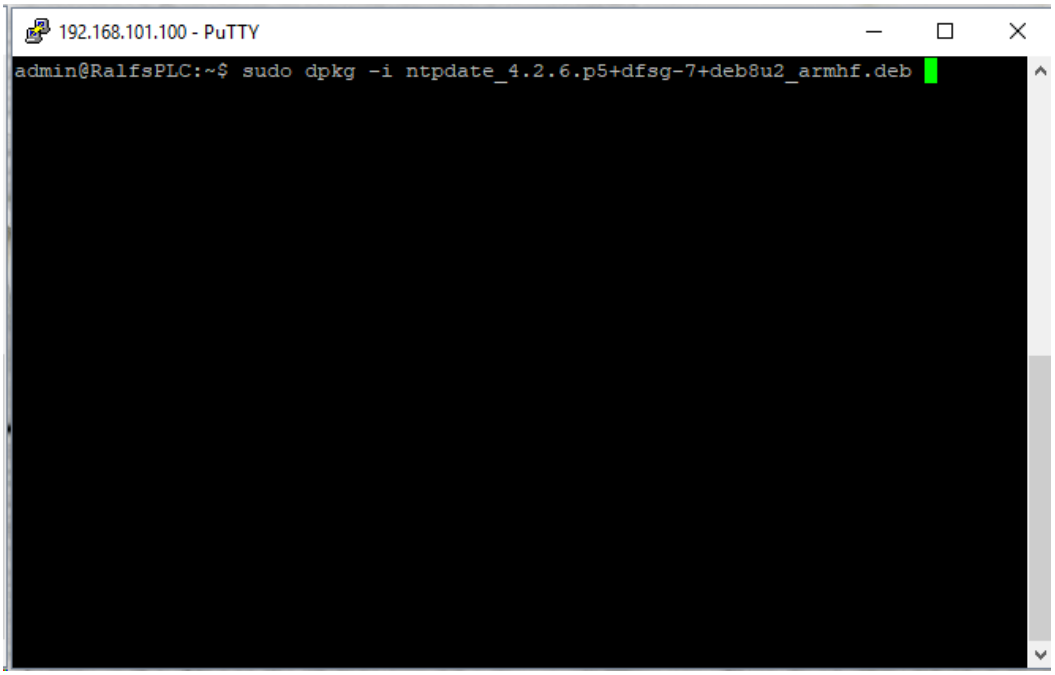
3.) First the additional package "l**ibopts25**" and then "**ntpdate**" needs to be installed as a **Debian** package.

The packages can be downloaded here:
https://packages.debian.org/de/jessie/armhf/ntpdate/download and
https://packages.debian.org/de/jessie/armhf/libopts25/download

To install the package, the downloaded .deb file needs to be moved to the PLC's filesystem (WinSCP can be used). The following command executes the Installation:

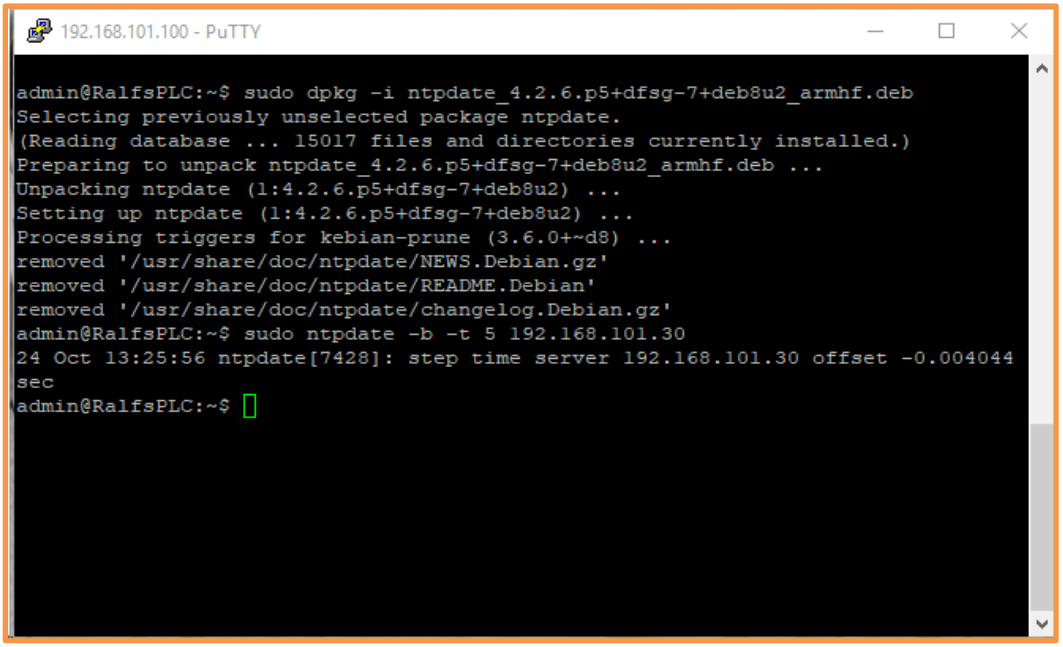
sudo

> `sudo dpkg -i [path of the package]`



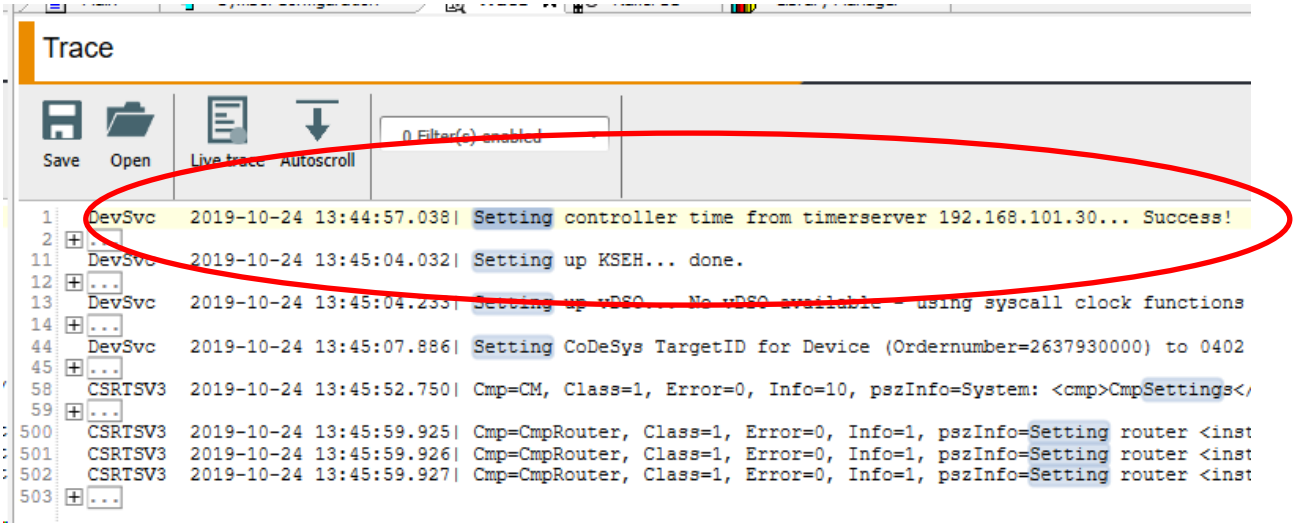
4.) After successful Installation, the package can be tested by the command:

> `sudo ntpdate -b -t 5 [ip address of the server]`



After the package has been installed, the PLC can be rebooted and the time from the NTP server is set as system time of the PLC during startup.

5.) A successful read of the time from a NTP server is also displayed in the Trace of u-create studio.



3 Using the PLC as NTP Server

Another use case for the NTP protocol is to setup a NTP server on the PLC, to synchronize the clocks of other devices with the PLC's clock.

There is a possibility, that the NTP package causes real time issues on the PLC. Just use it in case if there is no other possibility to implement a NTP server in the setup.

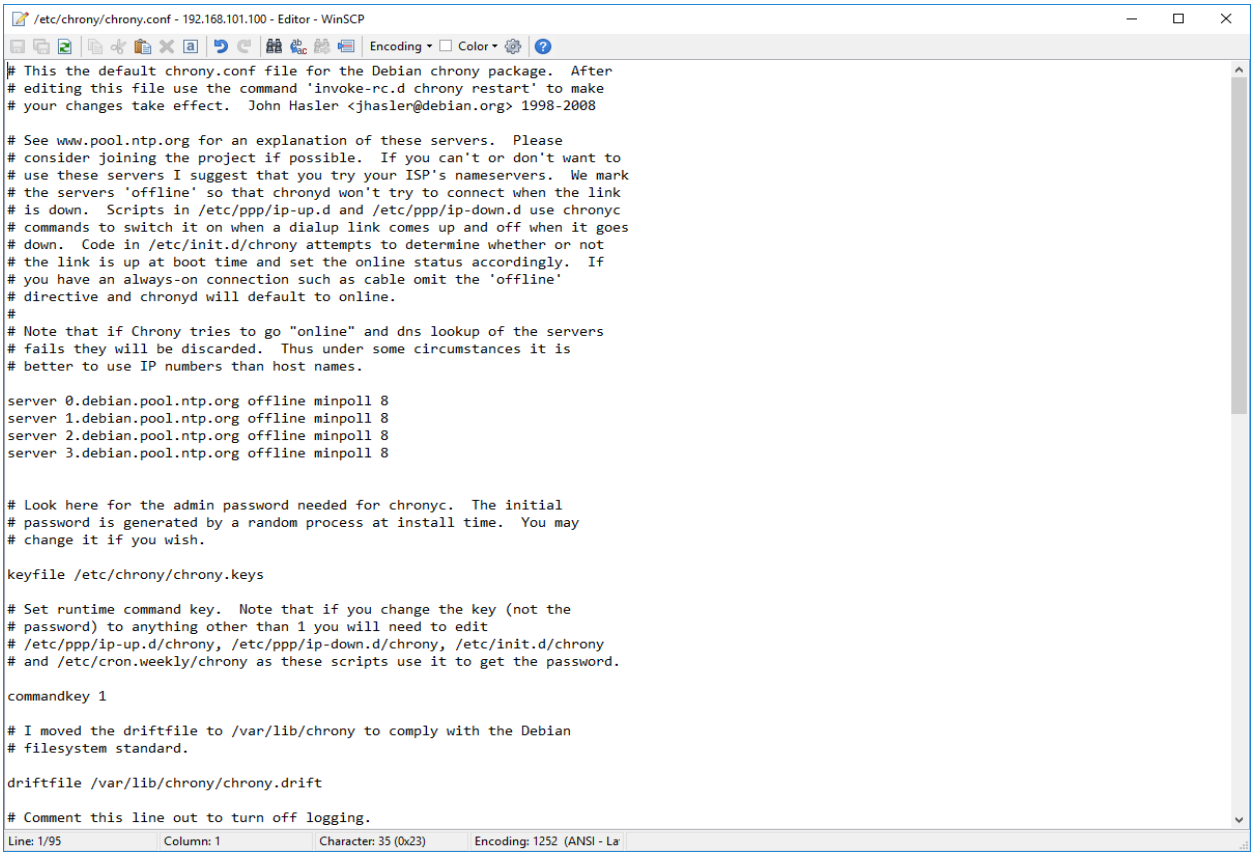
The NTP server is included in the package "**chrony_1.30-2+deb8u2_armhf.deb",** which can be found here:
https://packages.debian.org/jessie/armhf/chrony/download

To install the package, the downloaded **.deb file** needs to be moved to the PLC's filesystem (WinSCP can be used). The following command executes the Installation:

```
> sudo dpkg -i [path of the package]
```

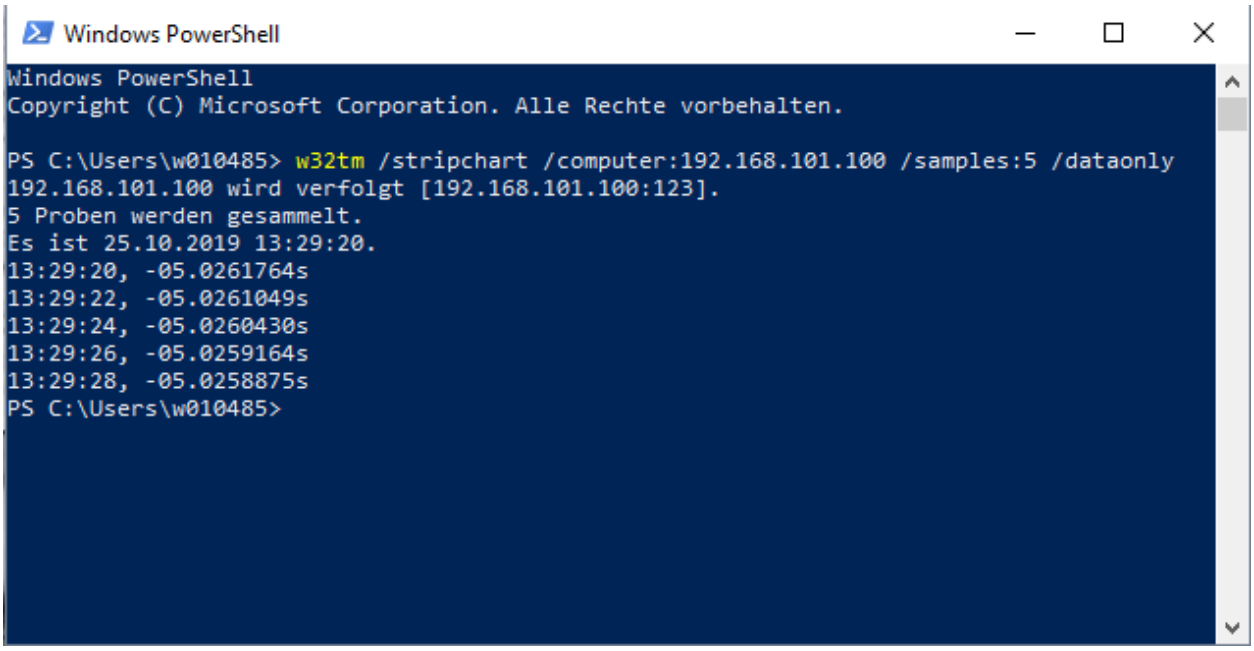
After the package has been installed, the PLC can be used as NTP server. The configuration file for the server can be found here:
/etc/chrony/chrony.conf

The configuration below shows the default configuration.



To test the NTP server from a Windows system, the following command can be used from the Windows PowerShell:
w32tm /stripchart /computer:192.168.101.100 /samples:5 /dataonly

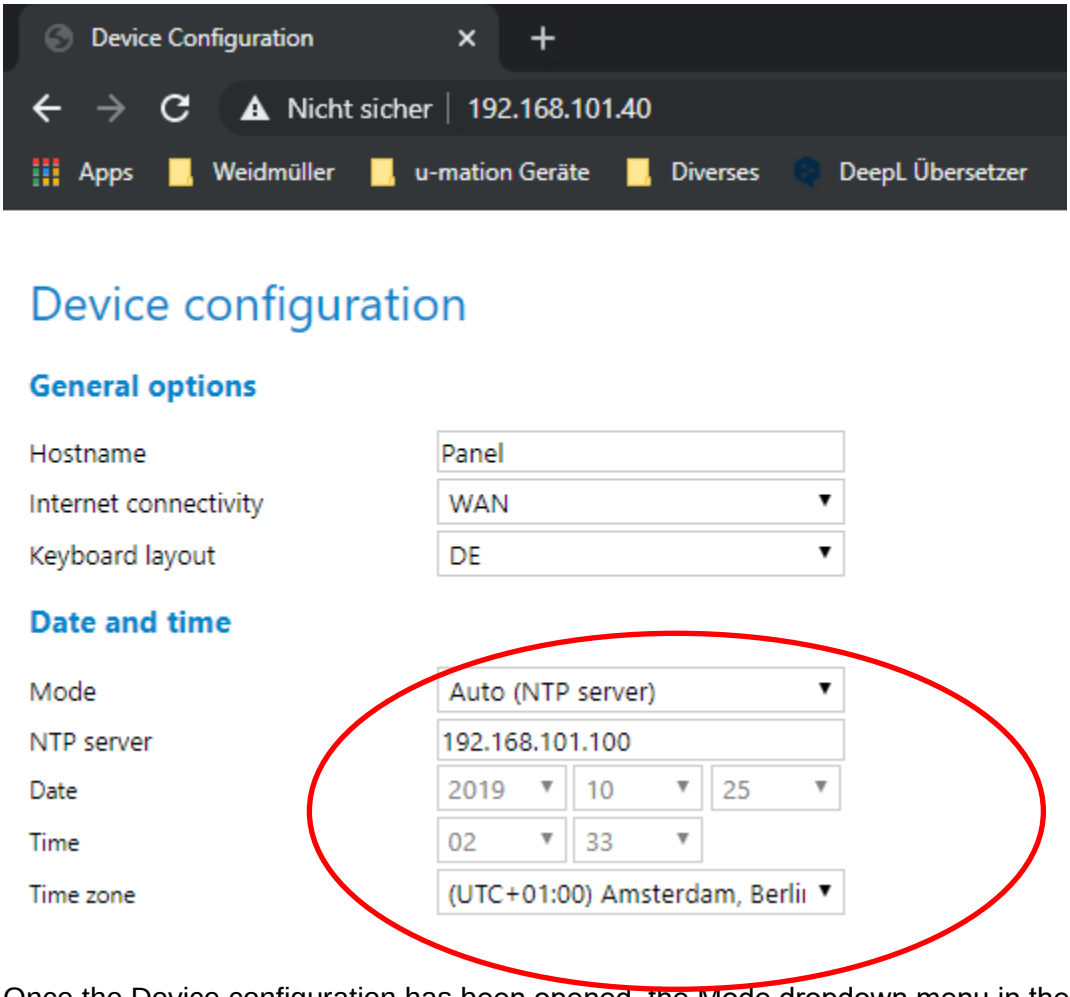
The result should look like this.



4 Connecting a u-view HMI to an NTP Server

The Weidmüller u-view HMI's offer the possibility to connect to a NTP server out of the box.

This setting can be done on the Device configuration website. This website can be accessed by entering the HMI's IP-address into a web browser.



Once the Device configuration has been opened, the Mode dropdown menu in the section "Date and Time" needs to be set to "Auto (NTP server)" and the NTP servers IP-address needs to be inserted into the field "NTP server".