

Tekron Installation Manual

28 February 2018

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1) Check the clocks input voltage range

Before connecting the clock to a power supply, make sure to check that the input voltage is within the acceptable power supply range.

On Tekron devices, the power supply input range can be found on the side serial number label (Figure 1) or on the small label located above or below the power supply connector (Figure 2).

Tekron's devices list the input power range on the side serial number label on every device, as well as a small voltage label above or below the power supply connector (Figure 2).

NOTE: For all products which DO NOT show polarity labels, polarity protection is installed meaning the device is not polarity sensitive.



Figure 1 – Example serial number label located on the side of the product

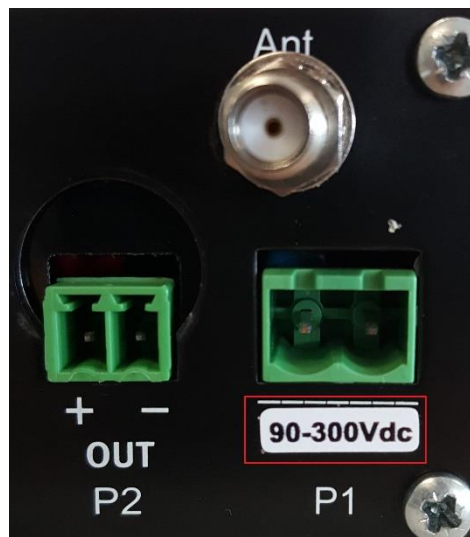


Figure 2 – Example voltage range label located above or below the power input

2) Connecting to your clock for the first time

Downloading the configuration tool

Before starting you will need to download the Tekron configuration tool. The configuration tool is located here;

<https://tekron.com/support/downloads/>

Expand the product folder and select the Configuration Tool download ZIP. The tool is a .exe file so does not need to be installed.

Download Config software manual

Please download the Tekron Software configuration manual before attempting to configure the clock. You can download the manual from here;

<https://tekron.com/support/downloads/>

This guide will directly reference the software configuration manual.

Creating an exception in your firewall

Firewall software running on your PC can block the Configuration Software from communicating with your network, stopping it from being able to discover or connect to Clocks. To resolve the problem, the Configuration Software must be allowed access through the firewall by adding a firewall exception.

Note 1: Even if your Window's firewall is **DISABLED**, it will still actively block all "Public" connections. Please follow the below instructions before attempting to connect to a Tekron device.

Note 2: To create an exception in a firewall, Tekron have put together a short guide based on a PC running Windows 7. This is a guide only and the required steps may differ from those described here, depending on your version of Windows.

Note 3: If your PC is a member of a domain, your Network Administrator may have restricted access to Windows Firewall settings. Refer to your Network Administrator if you are unsure.

Note 4: If your PC is running third-party firewall software, please refer to the documentation provided by the vendor of that software. Note that UDP ports 9990, 9992, 9997 and 9999 are used for configuration and management.

Procedure:

1. Go to Windows Firewall settings. This can be done by clicking the Start button, then click “Control Panel”, then click “Windows Firewall”. If the “Windows Firewall” option is not visible, first click “System and Security”.
2. In the left sidebar, click the “Allow a program or feature through Windows Firewall” link. Refer to Figure 3.



Figure 3 - Allowing a program through Windows Firewall

3. Click the “Change settings” button. Refer to Figure 4.

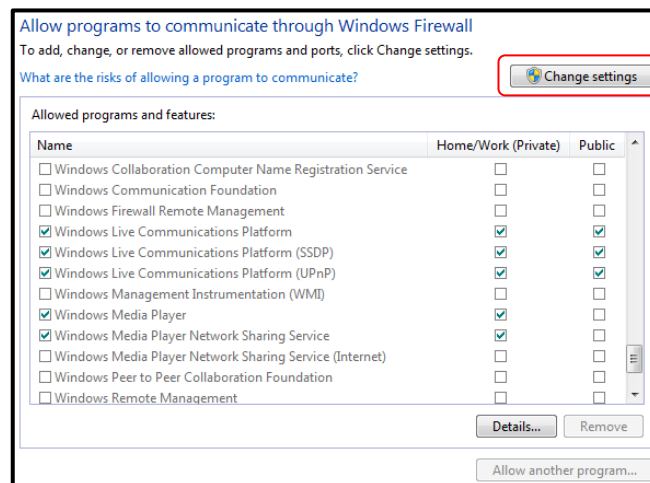


Figure 4 - Enabling firewall settings changes

4. Click the “Allow another program...” button. Refer to Figure 5.

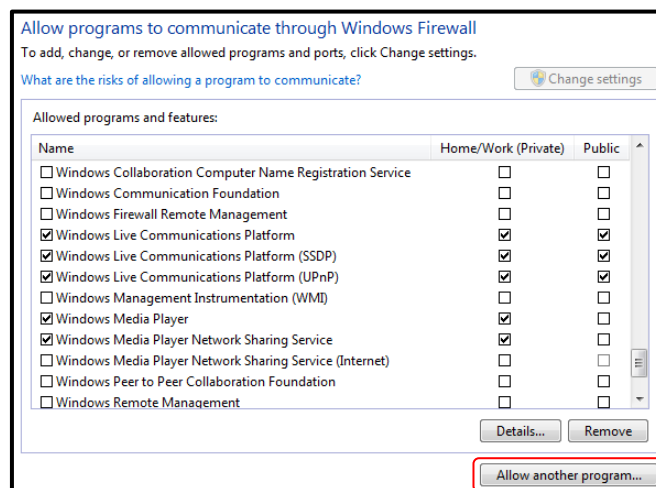


Figure 5 - Adding another program to allowed list

- Click the “Browse...” button. Refer to Figure 6.

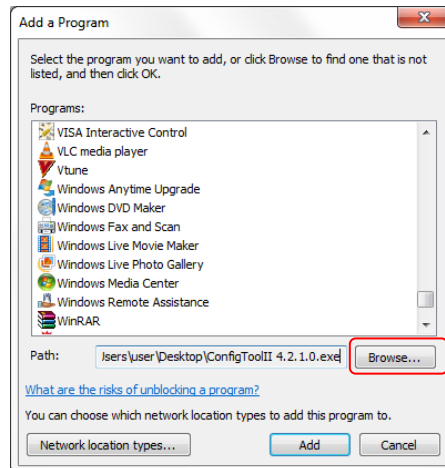


Figure 6 - Browsing for executable to add

- Browse to the location of the Configuration Tool executable, select it, and click the “Open” button.
- Click the “Network location types...” button. Refer to Figure 7.

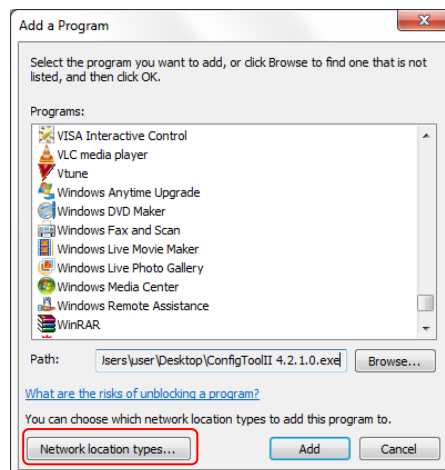


Figure 7 - Choose network location types

- Check all checkboxes next to the Domain (if present), Home/Work, and Public network locations, and click the “OK” button.

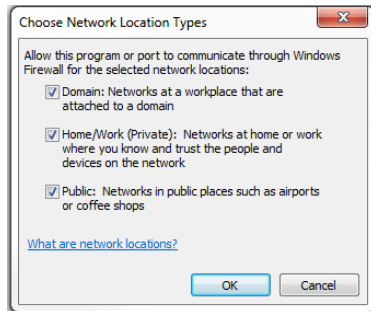


Figure 8 - Selecting network location types (domain network)

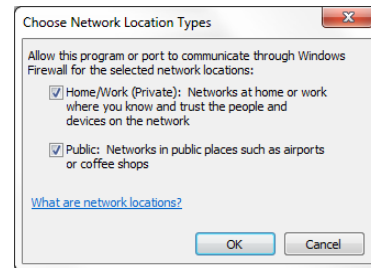


Figure 9 - Selecting network location types (non-domain network)

This is necessary to ensure that the Configuration Software can communicate with a directly connected Clock. Windows will be unable to determine the network type when connected directly to a Clock, and so will use the “Public” network type by default.

- Click the “Add” button. “Tekron Clock Config II” should now appear in the allowed programs list. Refer to Figure 10.

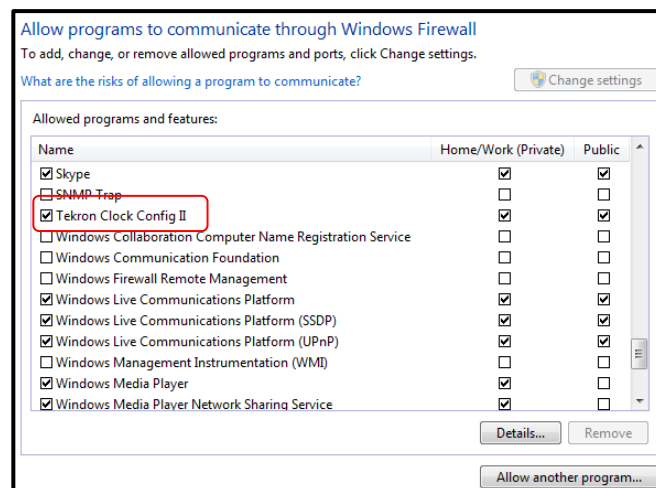


Figure 10 - Configuration software added to allowed programs list

- Click the “OK” button.
- Close the Windows Firewall settings window.

The Configuration Software should now be allowed through the firewall and able to connect to Clocks.

Connecting the clock to your PC

Tekron ships all its clocks with DHCP enabled on all of the network ports. When directly connecting to a PC, where no DHCP server is available the following will happen;

- 1) Connect the clock to the PC via an Ethernet cable.
- 2) Check the LNK and ACT LEDs located beside the Ethernet port. The LNK LED should be illuminated and the ACT LED will be to flash. Figure 11 shows an example of the LEDs in an inactive state.



Figure 11 – Example Ethernet port

- 3) The PC and clock will begin to negotiate, with the clock sending DHCP requests to the PC. Upon not receiving a response the clock will revert to an ARP tested link local address (169.254.xxx.xxx).

If the PC is also set to DHCP, it will also revert to an ARP tested link local address.

This negotiation process may take up to 1 minute to complete. Refer to Figure 12 and 13 to show identification states.

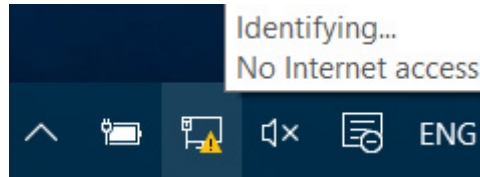


Figure 12 – “Identifying...” state will remain whilst the clock and PC are negotiating a connection



Figure 13 – When the clock and PC have connected, the PC will show the clock as an “Unidentified Network” with no internet access.

- 4) Now that the PC and clock are connected you may open the Tekron configuration software and press the “Discover button”. The clock connected to the PC should be listed once the discover sequence is complete.



Figure 14 – Press the Discover button to search for connected clocks

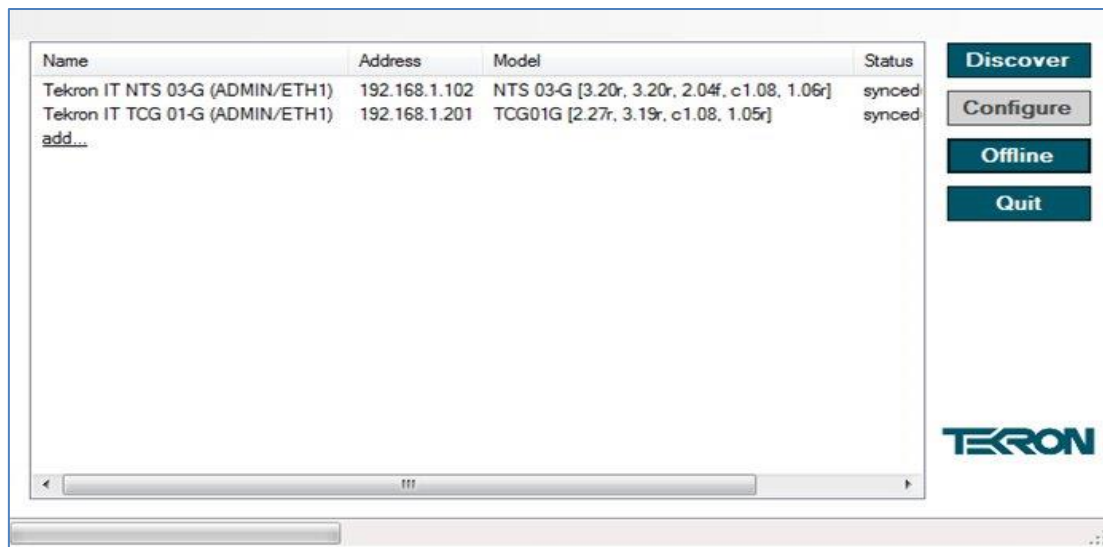


Figure 15 – All available clocks will be listed in the discovery window

- 5) You can now configure your clock by selecting this from the list and clicking “Configure”

Troubleshooting:

If the clock is not found after the discover button is pressed, please check your PC's IP address by following the steps in section 4 as well as your and firewall settings in section 2.

3) Changing the clocks Password

If you have ordered a Tekron clock with the security setting enabled, you will be presented with a password entry box when you try to configure the clock as shown in Figure 16. If this is your first time connecting to the clock the login details will be the following;

Username;
admin

Password;
Password

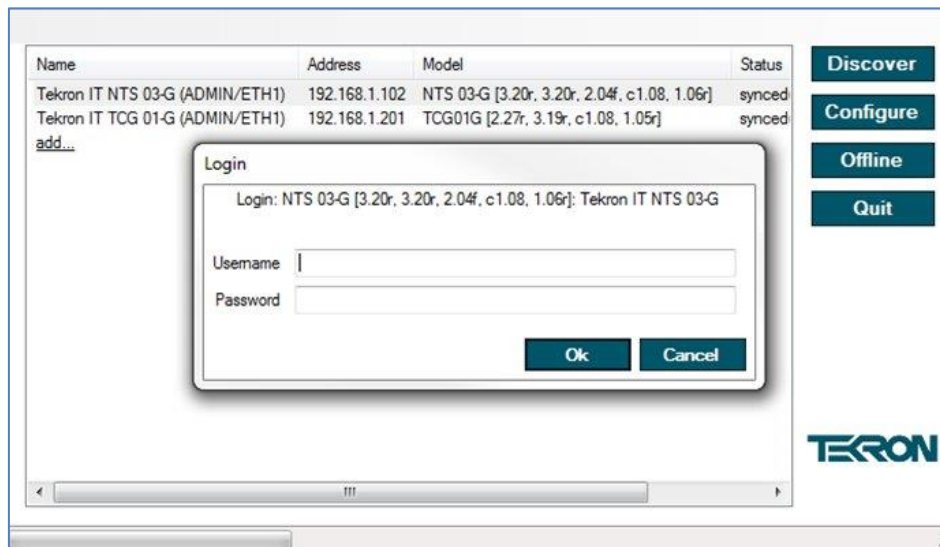


Figure 16 – Log in window

After entering these details and clicking “Ok” you will be presented with a “Change Password” box, as shown in Figure 17.

IMPORTANT NOTE: DO NOT FORGET YOUR PASSWORD!

If you enter a new password and forget this, the clock will have to be returned to Tekron at your expense to be completely reprogrammed. Whatever you do....do not lose that password!

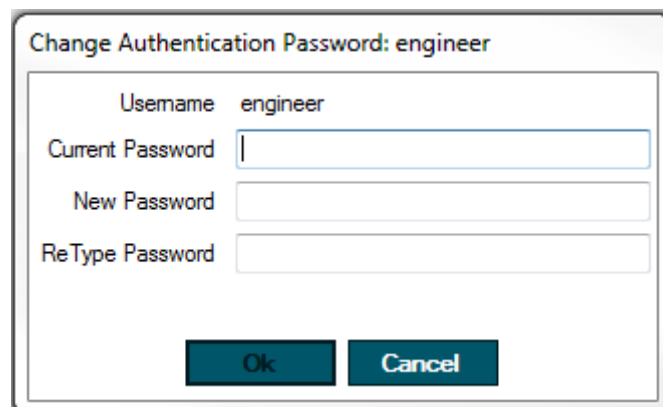


Figure 17 – Change password dialogue box

You can change our password anytime in the future by selecting the lock symbol along the top of the configuration software.



Figure 18 – Change password button

4) How to change your PC's IP Address

If your PC and clock are on separate IP address ranges, then you may need to change you PC's IP address to match the IP range that your clock is on. The following guide outlines how to change your Ethernet ports IP address.

1. Right Click on the Network icon in the bottom right hand corner of your PC window

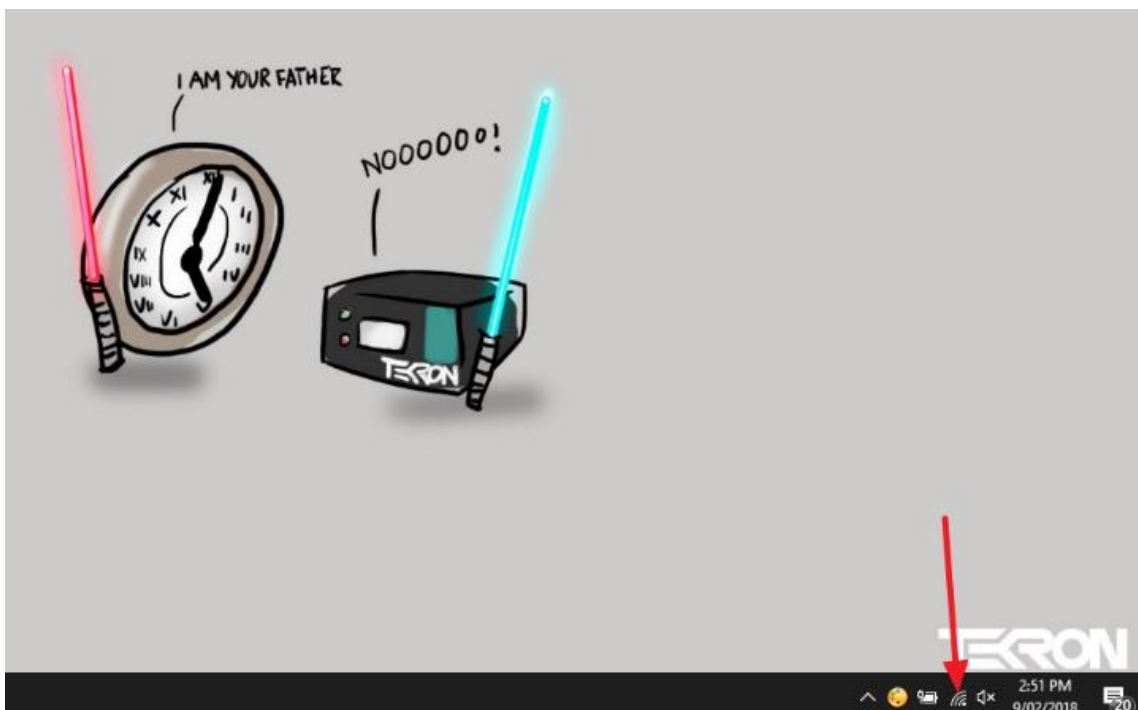


Figure 19 – PC Desktop

2. Select "Open Network and Sharing Centre"
3. Left Click on the Ethernet icon

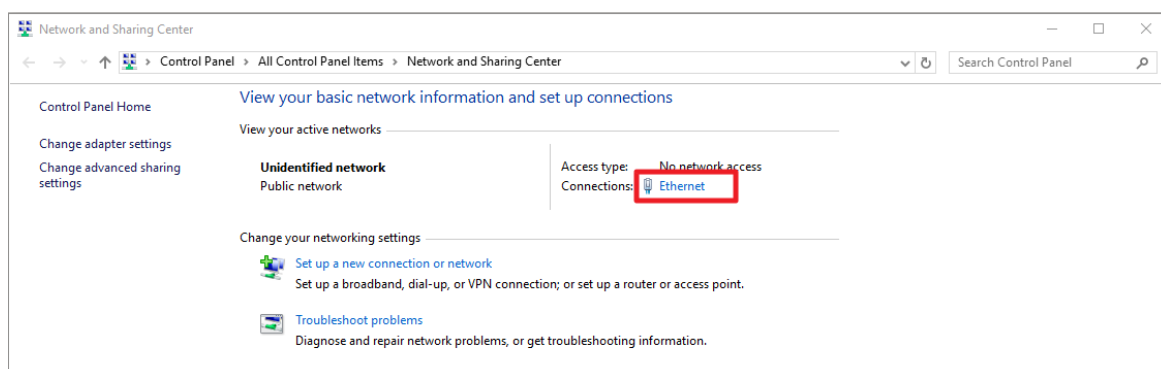


Figure 20 – Network and Sharing Center

- Click on the Properties Button.

Note: Access to this section could be restricted due to administration privileges.

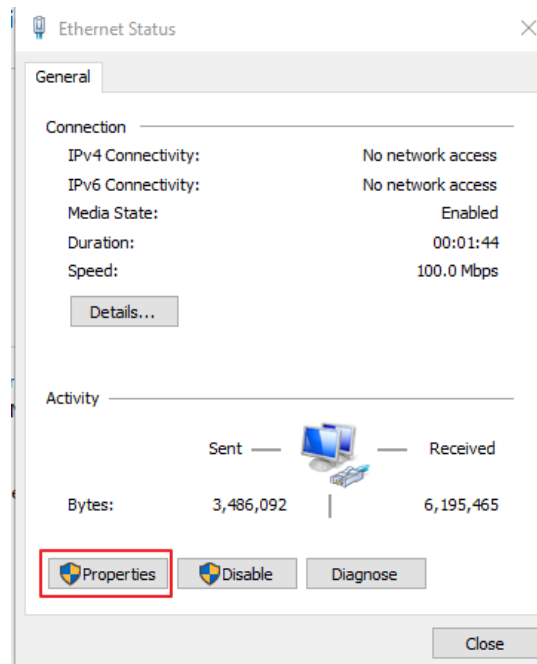


Figure 21 – Ethernet Status window – select Properties to change your IP address

- Select Internet Protocol Version 4 and press Properties

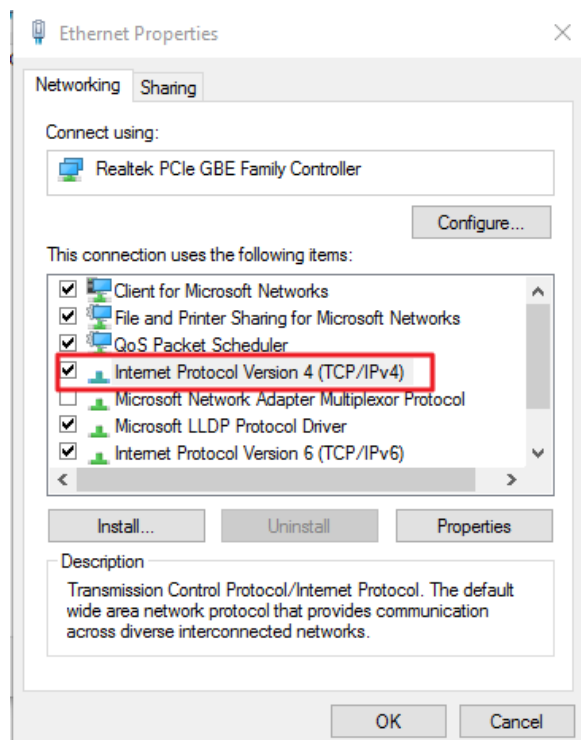


Figure 22 – Select Internet Protocol Version 4

- For setting a static IP address, select the radio button "Use the following IP address"

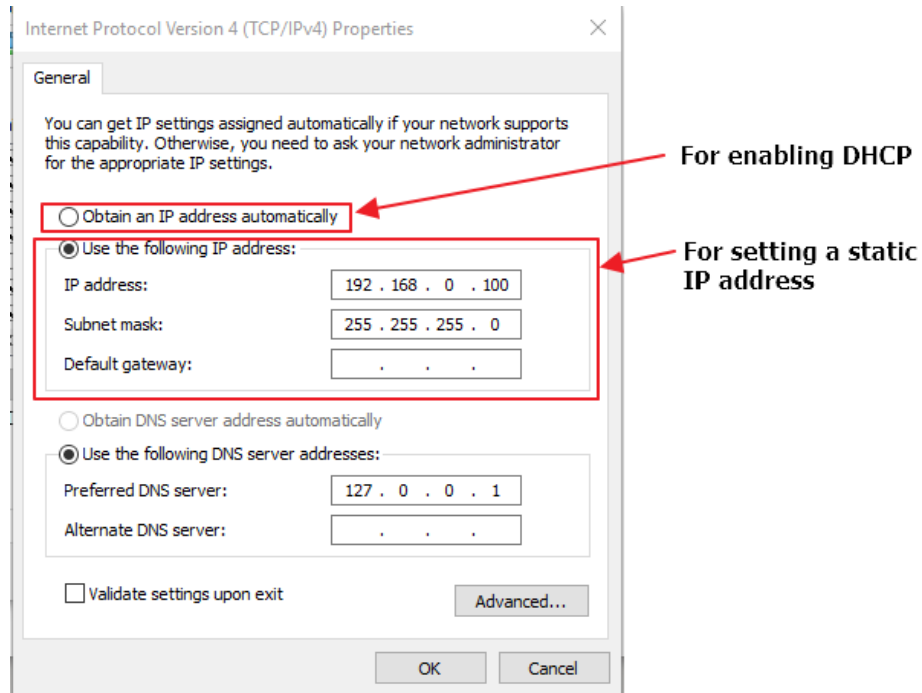


Figure 23 – Change to a static IP address and select a free IP address within the clocks address range

- For setting your PC to DHCP, select the radio button "**Obtain an IP address automatically**"

Note: To set your PC to be on the same subnet as a clock, set the first three octets of the IP address to be the same as the clock. Set the last octet to be different.

e.g. If the clock has the IP address: 168.192.96.100, set your PC to be on: 168.192.96.xxx where xxx can be any number apart from 100.

5) Setting your time zone

When you first click the “Configure” button on your selected clock, you will be taken to the Clock tab of the configuration tool. This first screen gives you a snapshot of the current clock with details on the clocks status (1), the reported time (2), test mode functions (3) and the localisation settings (4) as shown in Figure 24.

Note: To find out more about these setting, please refer to the Software Configuration Manual for a full explanation.

Figure 24 – Configuration tool clock tab

To set the time on the clock to operate in your time zone you will need to select the “lookup” button in the localisation section of the clock tab. This will present a dialogue box, where you can select the region in which you are based. This will load the time zone settings, including daylight savings settings, into the configuration tool.

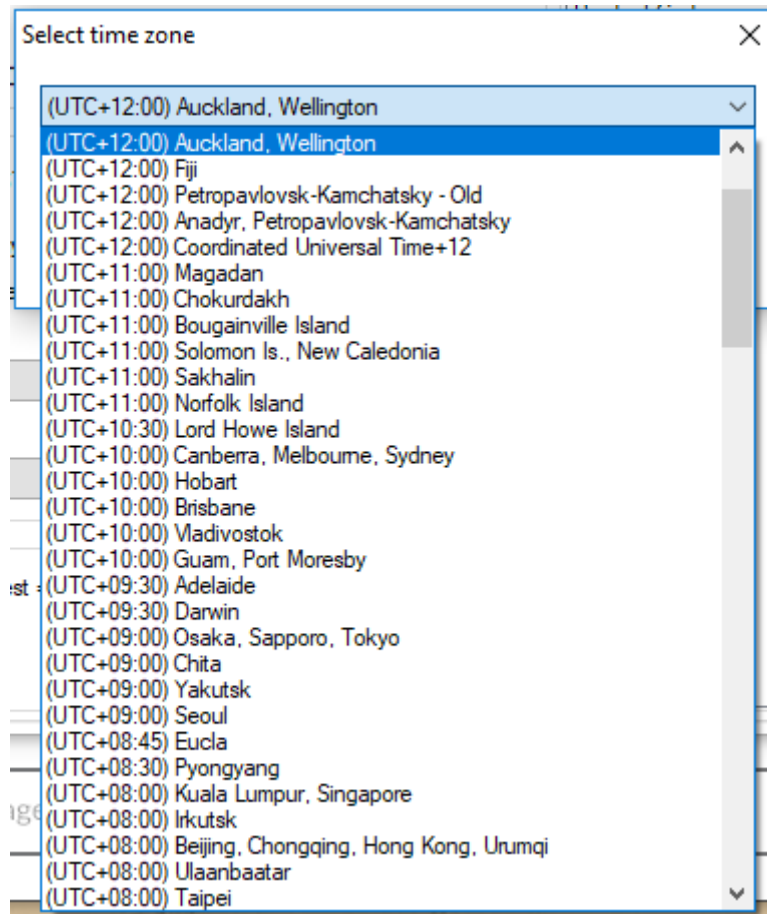


Figure 25 – Select the region where you are based and the configuration tool will automatically apply the daylight savings settings

To send these setting to the clock you must click the “Store” Button as shown in Figure 26.



Figure 26 – Store button will show a green colour when there are unsaved settings

6) Changing the clocks IP address

To change the clocks IP address, select the “Network” tab on the configuration tool, then select the Ethernet port you wish to edit.

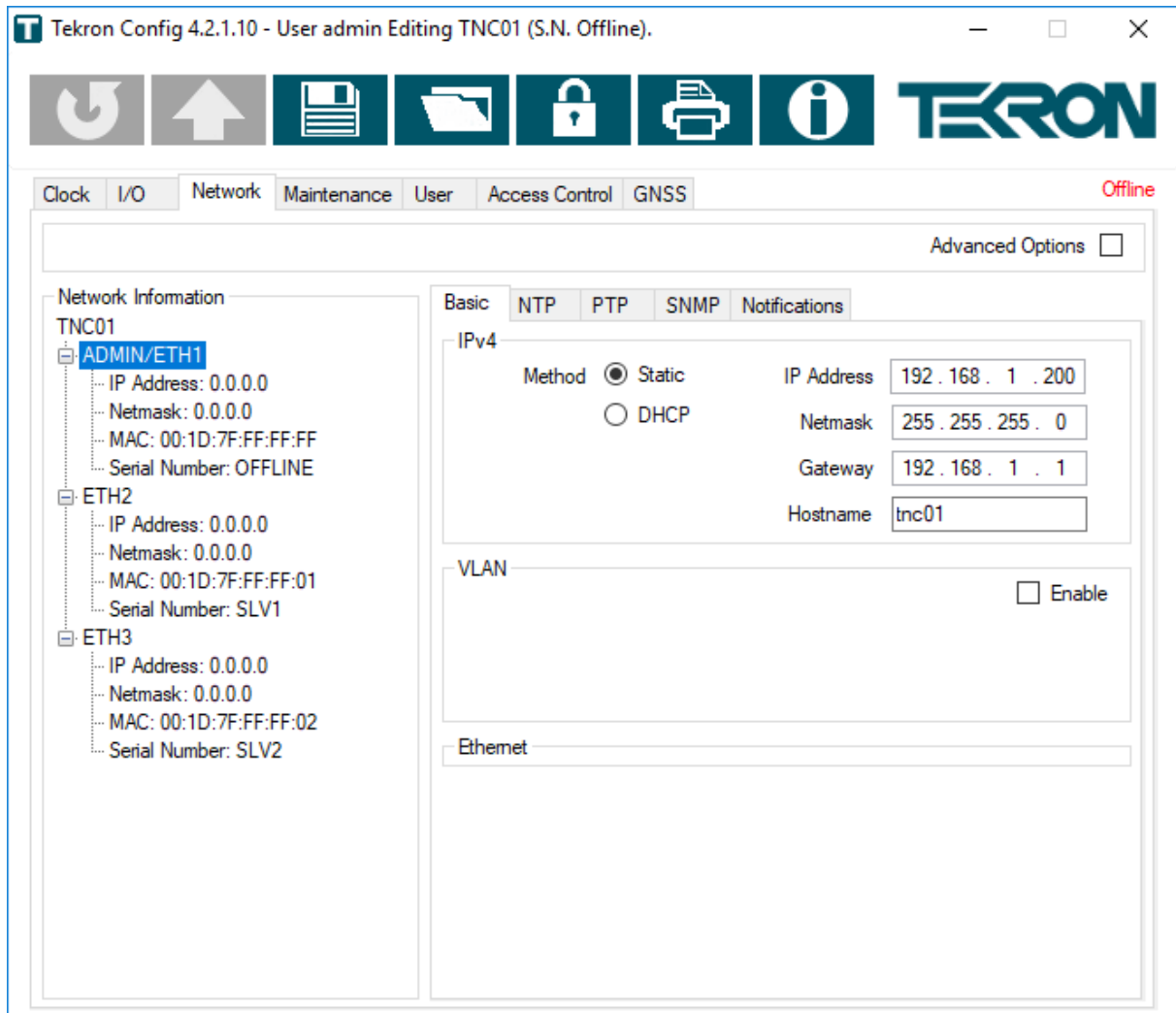


Figure 27 – Network tab showing available IPv4 settings

- 1) Select “Static” to set a static IP address
- 2) Enter into the IP address field the IP address you wish to store
- 3) Complete the Netmask, Gateway and Hostname
- 4) Click the Store button to send the settings to the clock.
- 5) The IP address has now changed.

Note: When you set a new IP address, the configuration tool will lose connection with the clock. This is normal, as the clock and PC will now need to re-establish their connection.

To reconnect, close the configuration window and return to the Discovery window. Click Discover and reconnect to the clock.

Depending on the IP range selected, you may need to adjust your PC’s IP address.

7) Changing the outputs

No matter which clock you have, all the available inputs and outputs on the clock will be located under the “I/O” tab on the configuration tool as shown in Figure 28.

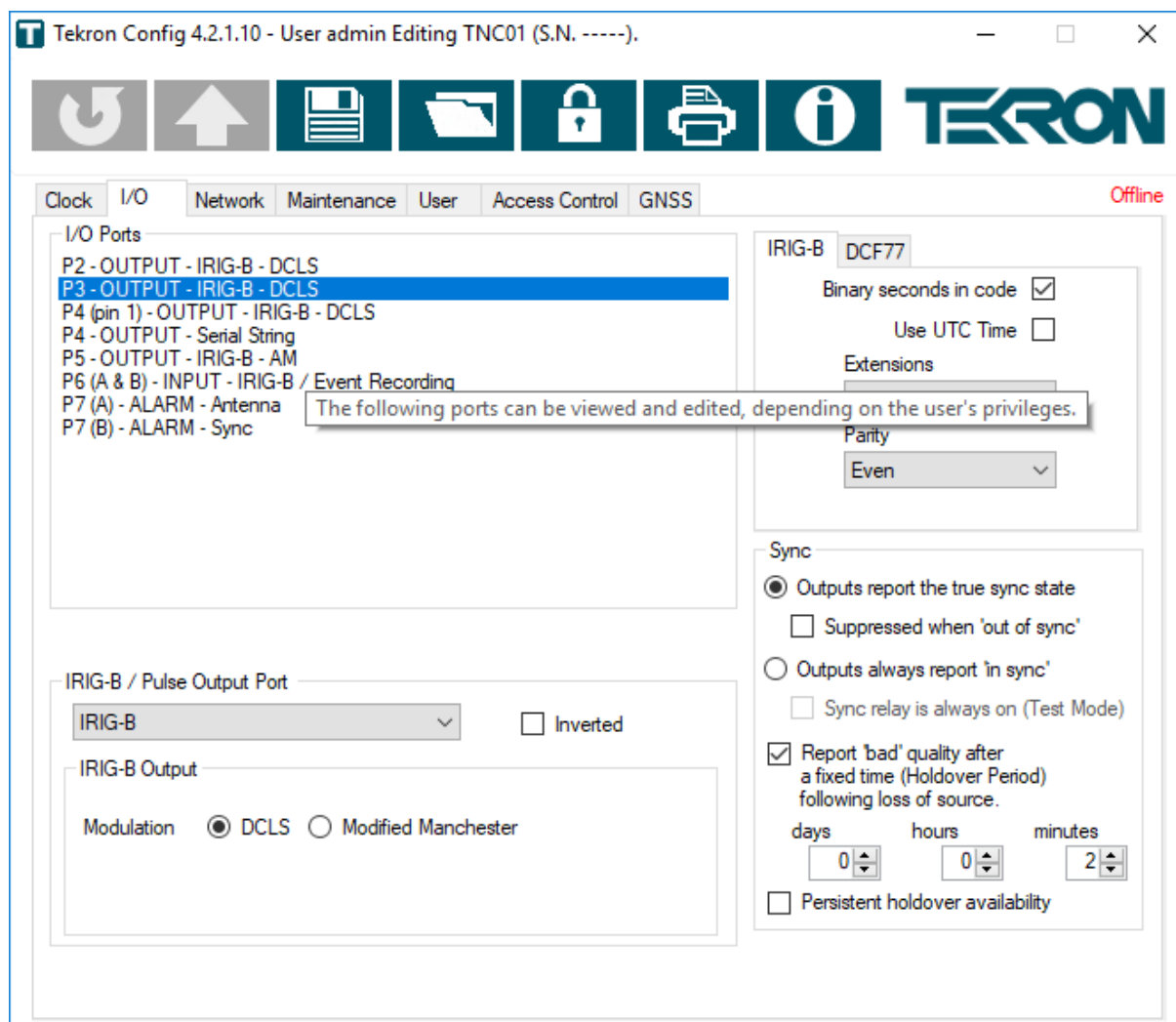


Figure 28 – Select the I/O tab on the configuration tool to modify an input or output

Select the output by clicking on the port designator and then change the settings as required. In the example shown in Figure 28, the user has selected the P3 output. The P3 output is configured to output IRIG-B DC Level Shift signals.

To change this, select the drop-down box shown in Figure 29 and select the desired output type.

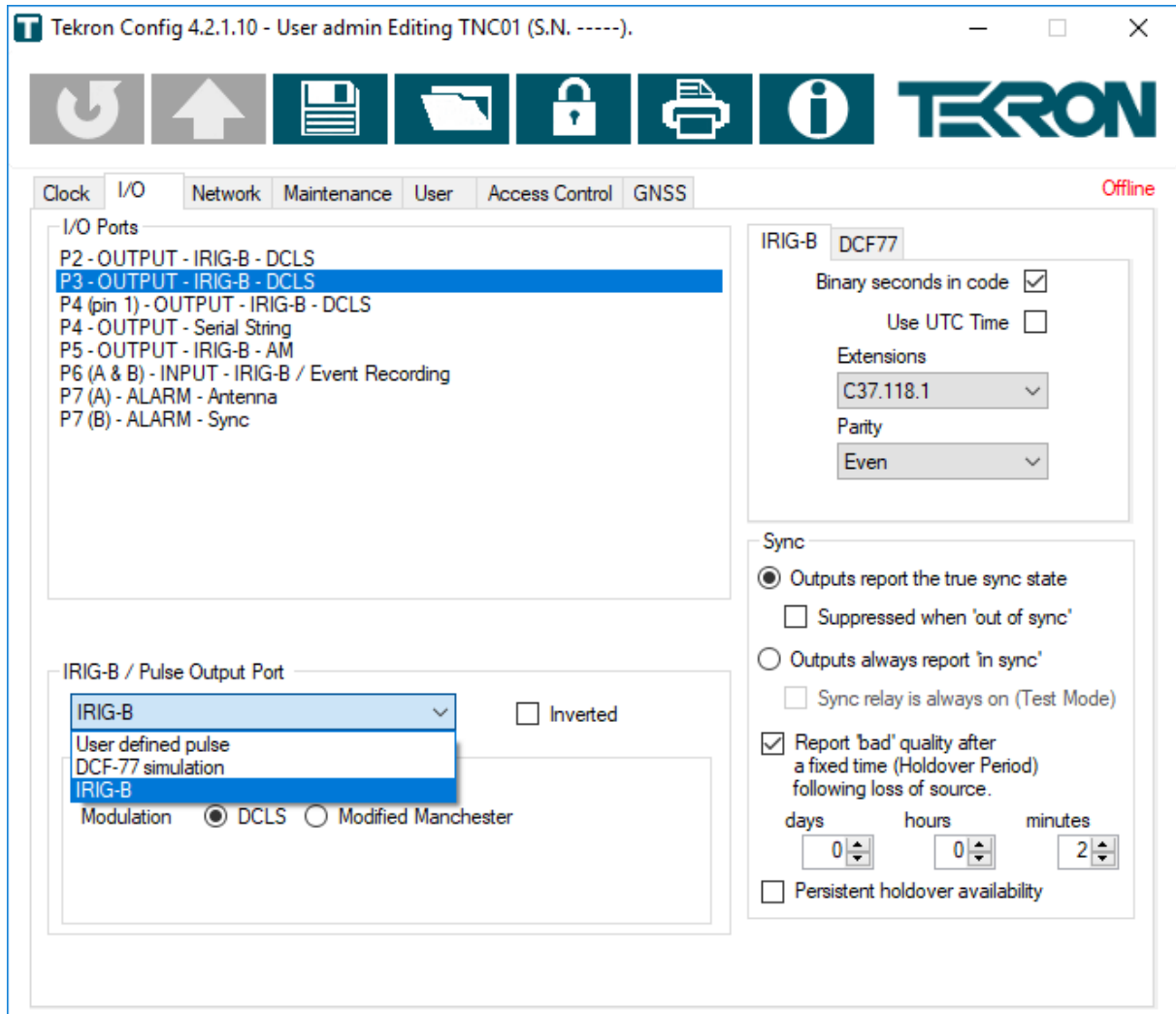


Figure 29 – To change the signal type click the drop-down box and select signal type

For more details on setting the outputs, please refer to the I/O section in the Configuration tool software manual.

8) Checking Clock status

To check the clocks status, navigate to the “Clock” tab on the configuration tool. The left pane on left side of this tab which is labelled “System Information” gives a snap shot of the status of the clock and any alarms that are present. It also shows the current sync state of the clock. An example of a clock in an alarm state is shown in Figure 30, with a list of alarm definitions given in Table 1. An example of a clock which is sync’d is shown in Figure 31, with a list of sync states and definitions given in Table 2.

System Information	
Status:	Out of Sync
Clock Name:	TNC01
User:	admin
Model:	TCG02G-MPH
Product Code:	R1-O29BAC-M2BBBBB
Clock Serial:	98769
Net Serial:	170013
Frequency Reference	OCXO
Clock Firmware:	2.28p51
Net Firmware:	3.21p51
FreqRef Firmware:	2.04h
GPS Firmware:	c1.08
UTC -> TAI offset:	36
Alarms	No Sync No Antenna Satellites Low Antenna Fault

Figure 30 – Example of a clock which is in an alarm state

Table 1 – List of alarm definitions

Alarm Messages	Definition
No Power A	No power source is detected on Power inlet A.
No Power B	No power source is detected on Power Inlet B.
Satellites Low	The number of satellites currently being used for time and position calculations is below the threshold.
No Sync	Clock is not synchronised to any source.
Holdover	Clock has lost sync and is now in holdover.
Non-holdover	The Clock is not in sync and holdover period has expired.
No Antenna	The antenna circuit current drain is low (typically under 3mA). This could be caused by poor connections, or if the connected antenna has a lower current drain specification or if a component in the antenna system is providing power to the antenna and therefore the Clock is not seeing a connected load.
Antenna Short	The antenna circuit current drain is high (typically over 100 mA). This is caused by a short in the antenna circuit, or by moisture ingress in the circuit, or if the antenna connected has a higher current drain specification.
No IRIG-B Input	No valid IRIG-B source is detected on the clock input. (This message only appears if the Clock is configured with IRIG-B monitoring enabled. Refer to the software manual for more.)

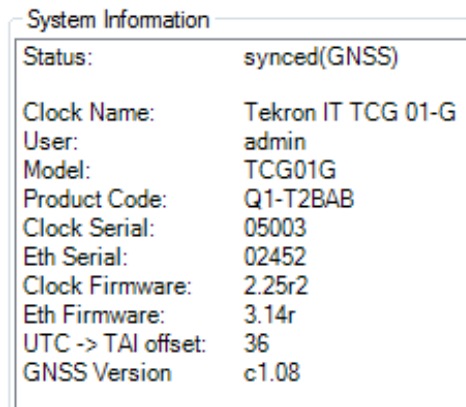


Figure 31 – Example of a clock which is correctly sync'd to GNSS

Table 2 – List of possible sync states

Sync Status Message	Definition
Synced(GPS)	Clock is synced to GPS Constellation.
Synced(GNSS)	Clock is synced to at least one of the available Constellations.
Synced(IRIG-B)	Clock is synced to an external IRIG-B source.
Synced(PTP)	Clock is synced to an external PTP source.
Synced(NTP)	Clock is synced to an external NTP source.
Synced(TEST)	Clock is in test mode and has been set with an arbitrary time.

9) Saving and loading configuration

As part of commissioning, it is advised to save a copy of the GNSS clocks configuration settings so that these may be loaded into future clocks for the same installation, or for system spares should a clock need to be replaced.

To save the configuration click the save button on the configuration tool (Figure 32). A dialogue box will appear allowing for the configuration file to be stored in an encrypted format rather than a standard XML file. Select the level of encryption required and then select a location to store the configuration file.



Figure 32 – Save button for saving configuration files to the PC

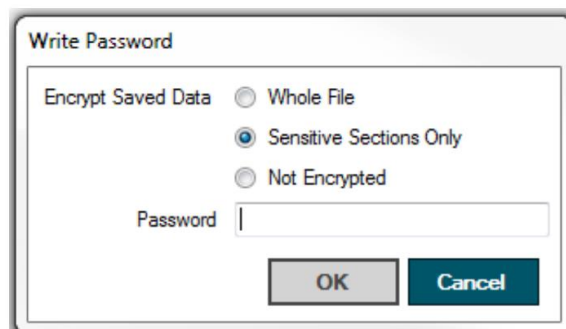


Figure 33 – Encryption options presented when saving a configuration file.

To load a configuration file into a new or existing clock, select the open file icon (Figure 34). Navigate to the configuration file and select this.

If the configuration file matches the clock that you are connected to, then the file will load and show a list of changes that are going to be made to the clock (Figure 35). Select “Accept” to load the configuration.



Figure 34 – Load button. Use to load in pre-stored configuration files

Variable	Old Value	New Value
user.own.supervisor	False	True
Created By	Not Set	admin
Stored By	admin	user
Module Serial Number	Offline	70001
Product Code	F1-TXXX-XX	F1-T22A-FF
Version	3.12b3	3.10r
Unit Name	TNC01	Tekron IT NTS 03-E
Source Priority	GNSS => IRIG-B => PTP => SNTP	GNSS => PTP => IRIG-B => SNTP
Holdover Time	2 Minutes	1 Minute
Monitor Input IRIG-B	True	False
Disable Power Alarms	False	True
IPv4 Hostname	tnc01	tnc01test
IPv4 Address	192.168.1.200	192.168.96.110
IPv4 Enable DHCP	True	False
IPv4 Gateway	192.168.1.1	0.0.0.0
SNMP Contact	Tekron International Ltd	Admin IT
SNMP Location		Tekron
SNMP Maximum Authenticated Access	Read-only	Read/Write
SNMP Maximum Unauthenticated Access	None	Read/Write
NTP Broadcast Interval	64 Seconds	Off
NTP Broadcast Version	4	1
PTP TLV C37.238		
Required	False	True
GM Identity	0	3
PTP TLV Localtime		
Enable	False	True
Required	False	True
GNSS mask angle	5	6
Disable clock security	False	True
(ETH2) PTP Enable	True	False
(ETH3) PTP Enable	True	False

☐ Load basic network settings
Stored By: user

Report Cancel Accept

Figure 35 – Change list presented to user before changes are applied to the connected clock

Finally, to print or save a copy of the configuration settings, clock firmware version, serial number and similar information, click the printer (Figure 36) along the top of the configuration tool. This presents the full configuration of the clock in a plain text format and can be used as a commissioning report.



Figure 36 – Print the configuration to a file as a commissioning report

10) Checking Satellite visibility (installation)

The most common issue encountered with a GNSS clock is a poor antenna installation, meaning that the clock cannot maintain a clear view of satellites at all times

To verify that the antenna installation has been done correctly with a clear sky view, it is recommended to take a 24-hour satellite capture to identify if there are any times where the satellite number drops to zero or if there are any obstructions to the antenna's sky view.

To take a 24-hour satellite recording, navigate to the GNSS (GPS) tab on the configuration tool (Figure 37) and click the Statistics Button (point 1 in red). Click the "Disable Automatic Logout" (5) box and leave the configuration tool running on the PC connected to the clock for a 24-hour period.

As the satellites change their orbit over the 24-hour period, the "GNSS availability" (2), "Average strength of useable satellites" (3) and "Satellite Visibility" (6) map will all update. Each field is explained below;

GNSS Availability;

The Pie Chart provides statistics on the average number of satellites tracked, and if during the logged period the receiver momentarily could not track any satellites, it will indicate the duration of the longest of the occurrences.

Average strength of usable satellites;

The bar Chart gives an indication as to the average strength in dBHz of the usable satellites that were logged.

Satellite Visibility;

This section contains a satellite map and over time plots each tracked satellites orbital path. GPS satellites and their trails are in blue, and GLONASS satellites and their trails are in red. The present location of the satellite is represented by the marker " ", and the Satellite Vehicle Identifier is located adjacent to it.

The top of the satellite map marked as 0 degrees is the bearing in relation to North. The 90, 180 and 270° markings represent East, South and West respectively.

The concentric circles on the satellite map represent the angle above the horizon. Therefore; the centre of the map represents the space directly above the antenna looking up into orbit.

Gaps in the satellite plot show area's where the clock cannot see satellites. This could be because of an obstruction, or in the case of the plot in Figure 37, an area where satellites do not orbit such as the North or South Poles (plot taken in New Zealand). Reviewing the satellite plot gives indications of potential issues with the antenna installation, should there be large gaps in the satellite map.

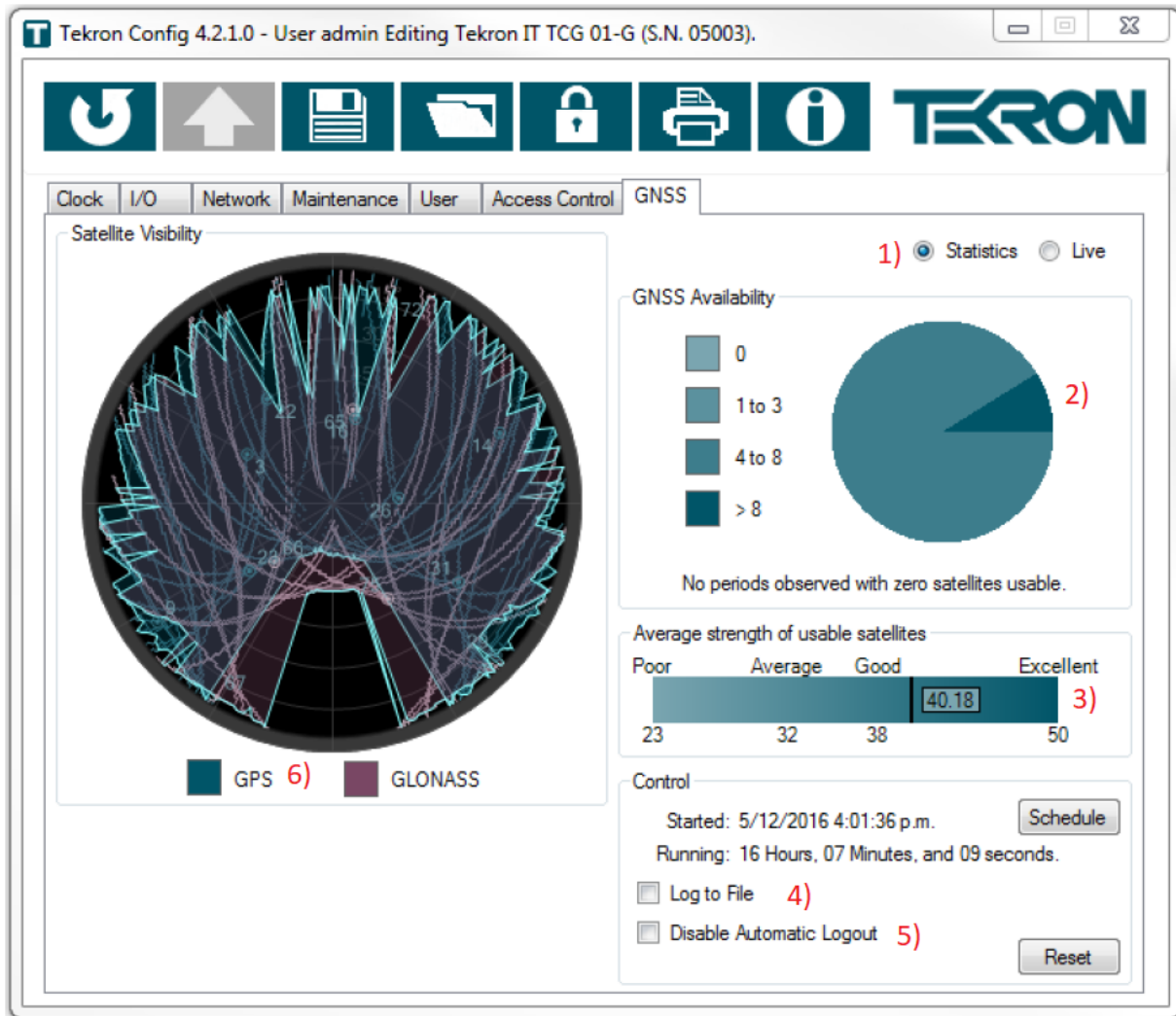


Figure 37 – Satellite statistics tab showing satellite availability

To record the raw satellite data to a file, use the “Log to File” (4) box and select a save location. This feature will log the raw satellite data directly to a text file, which can then be imported into software such as Microsoft Excel for analysis.