B&P Elektromotoren

ENGINEERING TOMORROW

Application Guide

Connecting to iC7 Series Remotely via Mobile Network



drives.danfoss.com | iC7

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1 Introduction

1.1 Version History

This guide is regularly reviewed and updated. All suggestions for improvement are welcome.

The original language of this guide is in English.

Version	Remarks	Software Version
M0044601, document version 01	Preliminary release	x.x.x

1.2 Purpose of this Application Guide

This application guide is intended for qualified personnel such as:

- System integration engineers who need remote access to drive(s).

This application guide provides an overview of how to establish a remote connection to a Danfoss iC7 drive via the mobile network using a 5G gateway from Teltonika Networks.

The gateway enables users to securely connect from their office to a Danfoss iC7 drive located in the field or factory. Once connected, users can employ the Danfoss iC7 commissioning and monitoring tool, MyDrive® Insight, to remotely access the drive. This process is identical to using MyDrive® Insight with a local PC directly connected to the iC7 drive.

1.3 Safety Symbols

The following symbols are used in this guide:

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

2 Application Overview

2.1 Why use a 5G gateway?

A 5G gateway offers several advantages for establishing a remote connection to a Danfoss iC7 drive:

- For tasks like scope logging or live data streaming via MyDrive® Insight, low latency is critical.
- When fetching data from the Danfoss iC7 drive during run-time, a 5G gateway provides higher bandwidth. This translates to faster data transfers.
- 5G represents the cutting edge of mobile data transmission, offering a future-proof solution for remote access needs.

The gateway also supports previous technologies like 4G and 3G. Even in areas without 5G coverage, at least a 4G access is probably available.

NOTICE

- If multiple iC7 drives need to be connected to the gateway, then a simple unmanaged switch can be added between the drives and the gateway. The gateway will handle the IP address assignment to the individual drives using the DHCP Server located in the gateway.

2.2 Prerequisites for Remote Connection to a Danfoss iC7 Drive

To establish a remote connection to a Danfoss iC7 drive, the following is required:

- A 5G/4G gateway from Teltonika Networks.
- A SIM card from a mobile subscription provider is needed to access the mobile network through the gateway.
- A license for Teltonika Networks Remote Management System (RMS) is necessary. The RMS solution eliminates the need for fixed IP addresses from a mobile subscription provider, reducing overall connection costs.
- An Ethernet cable with at least Category 5E rating is required to connect the Teltonika gateway to the Danfoss iC7 drive.
- The Danfoss MyDrive® Insight commissioning and monitoring tool must be installed on a PC that will connect to the Danfoss iC7 drive.
- Install the OpenVPN Connect client on the same PC where Danfoss MyDrive® Insight is installed.
- Port X0 on the iC7 drive must be configured for automatic IP address assignment (DHCP).

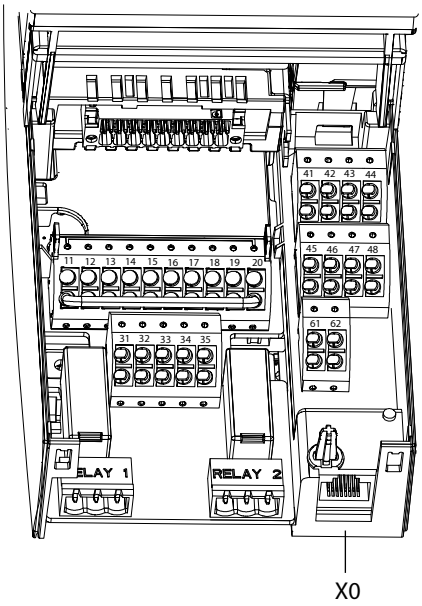


Figure 1: Port X0 on the iC7 drive

2.3 Network Architecture

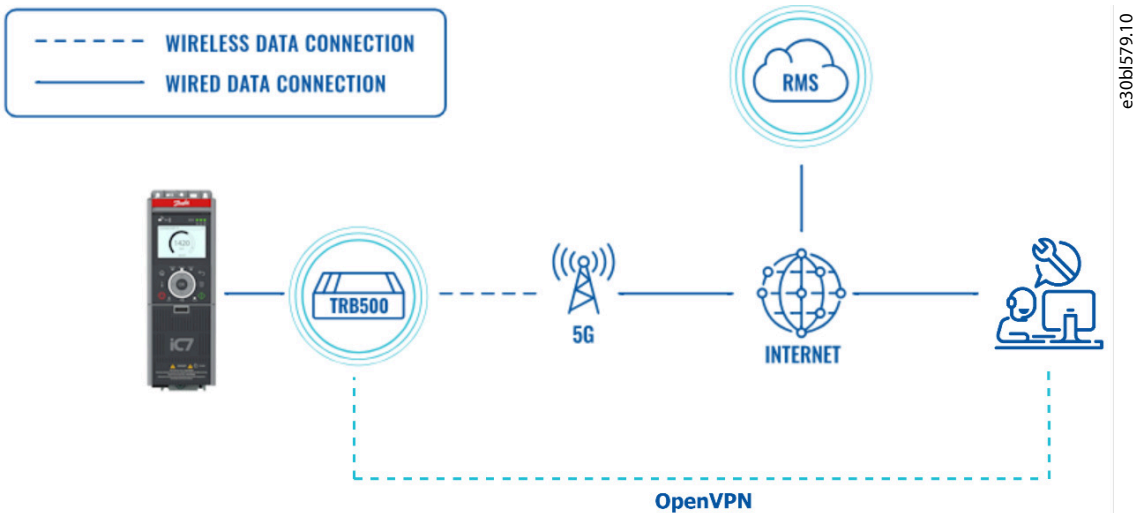


Figure 2: Network Architecture

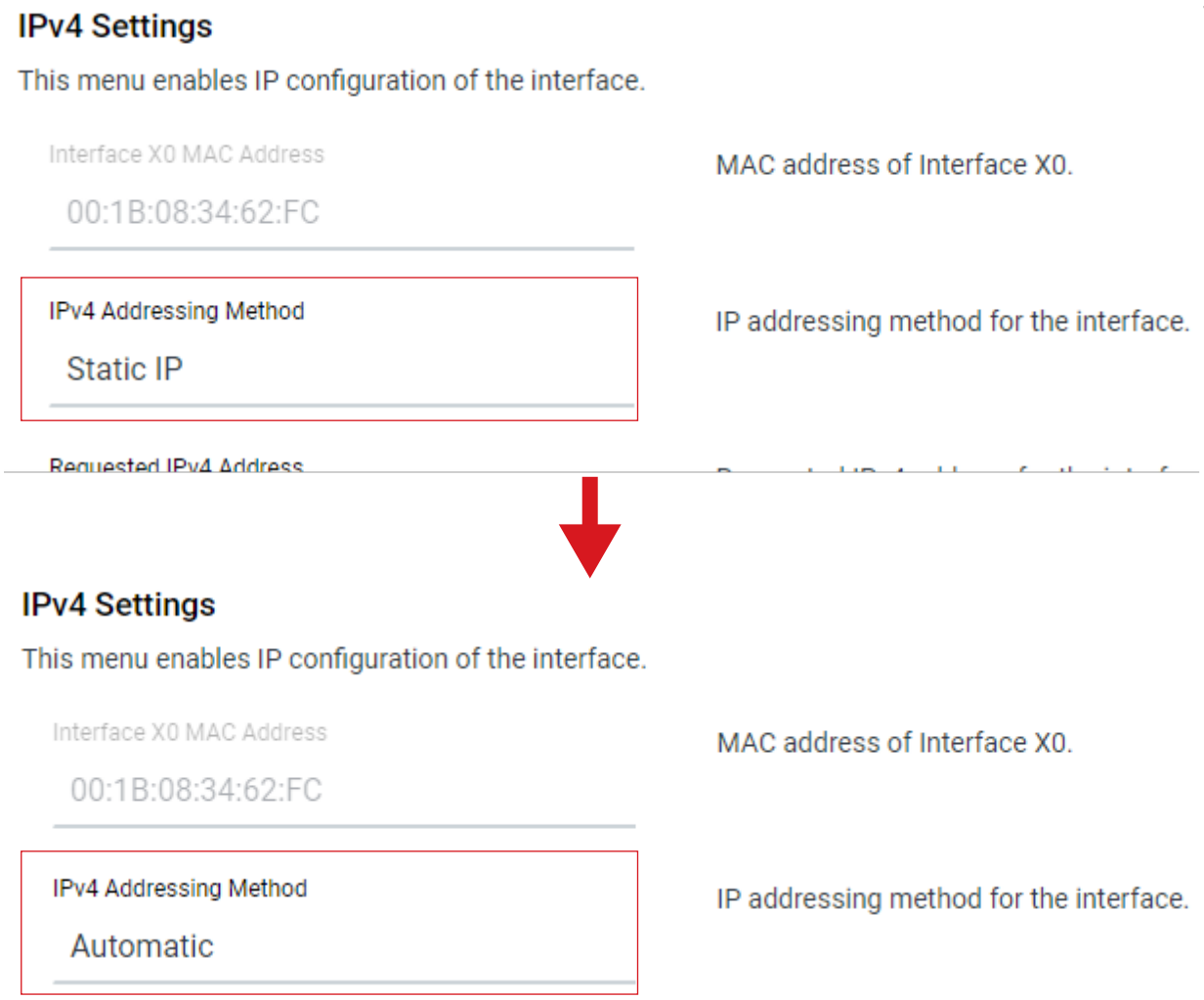
3 Configuration Set-up

3.1 How to Set up Gateway, RMS, and Drive

This section provides step-by-step instructions on setting up the TRB500 gateway, Remote Management System (RMS), and the iC7 drive to enable remote connectivity and monitoring via the Danfoss MyDrive® Insight tool.

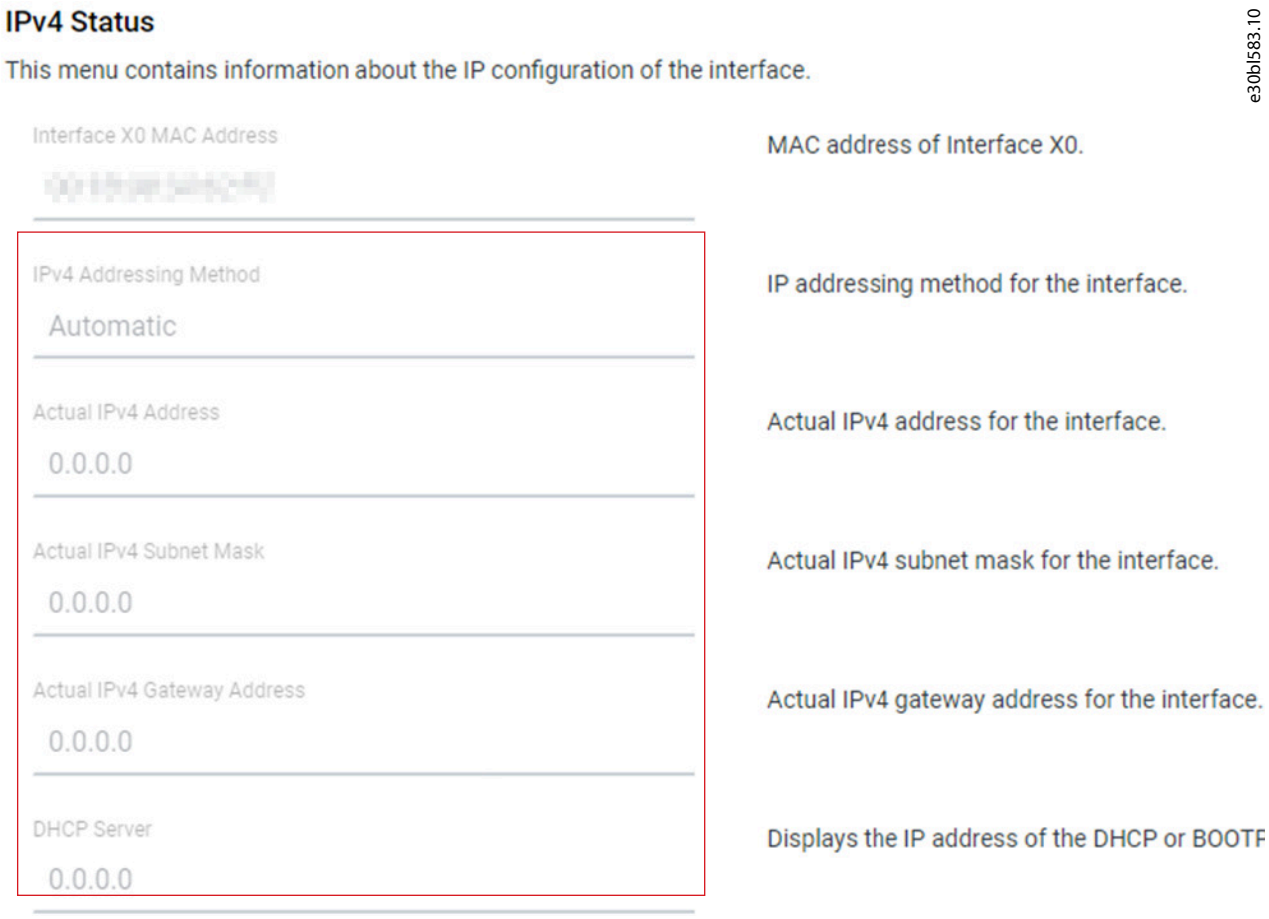
1. First, configure the TRB500 gateway to access the mobile network. Refer to the Teltonika Networks quick start guide. Once the connection is established, proceed to the next step.
2. Connect to the Teltonika Networks Remote Management System (RMS). Note that license fees might apply. For more information on RMS licensing Refer to teltonika-networks.com.
3. Disconnect the Ethernet cable from the PC mentioned in step 1 and connect it to port X0 (service port) of the iC7 drive instead.
4. Change the IPv4 addressing method on interface X0 of the iC7 drive from *Static IP* to *Automatic*. This can be done using the control panel or Danfoss MyDrive® Insight tool. This enables the drive to request an IP address from the DHCP Server running in the 5G gateway. Finally click APPLY to save changes.

   The below pictures show how it is done on MyDrive®.



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5. Once the IP address method has been changed, verify that the drive has received a valid IP address from the gateway. This is done in the IPv4 Status page.



There should be a valid entry in all fields now:

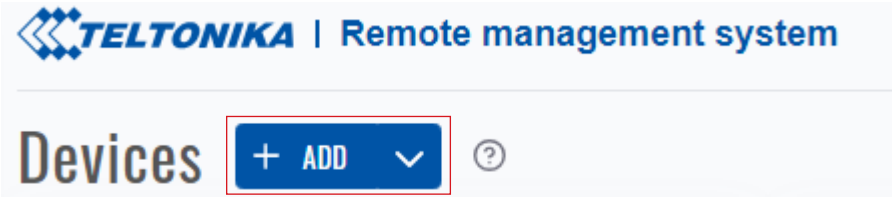
- The actual IPv4 Address (default is 192.168.2.xxx, where xxx is a value100–199).
- The actual IPv4 Subnet Mask (default is: 255.255.255.255)
- The actual IPv4 Gateway Address (default is: 192.168.2.1)
- DHCP Server (default is 192.168.2.1)

If all values are 0.0.0.0, the DHCP server in the gateway is possibly disabled, needs reconfiguration, or there is a network fault. If necessary, configure the DHCP server directly from the RMS. For more information on the DHCP configuration, see wiki.teltonika-networks.com.

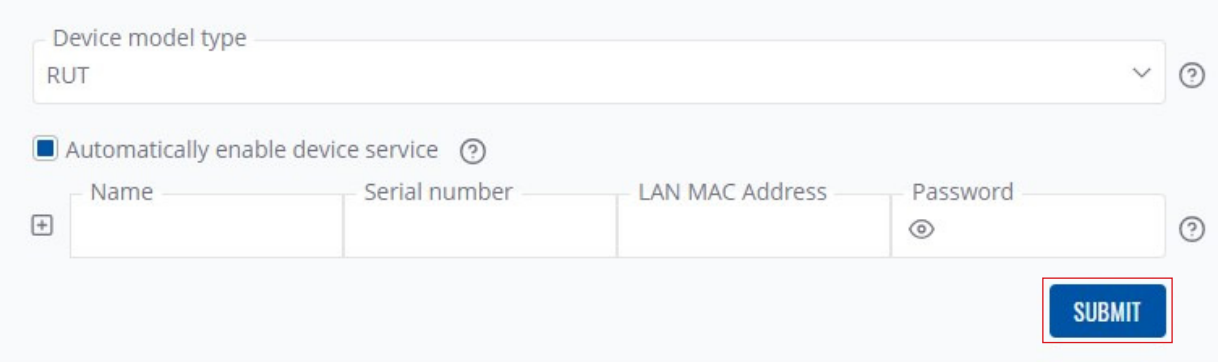
6. Create the Virtual Private Network (VPN) directly from a PC where MyDrive® Insight is installed. This VPN connection establishes a secure and encrypted link between the PC and the gateway, essentially creating a transparent bridge between the 2 networks. To set up the VPN connection, log in to the RMS connectivity portal with a Teltonika Networks account.

NOTICE

- Before creating the VPN, ensure that the gateway is added to the RMS. Log in and click the "Add" button at the top of the screen.



Fill in the gateway details on the form and then press the *SUBMIT* button.

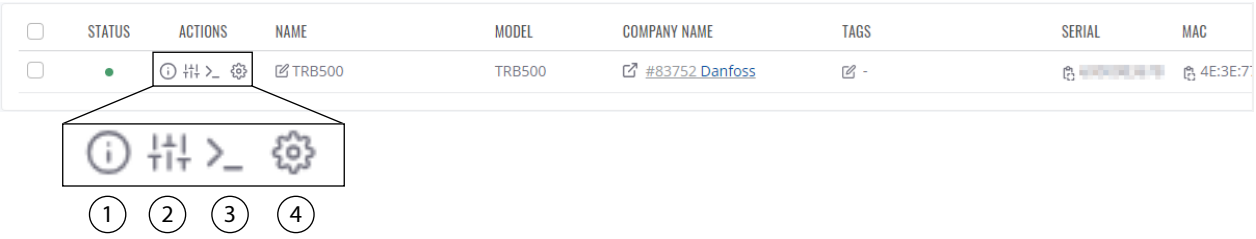


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RMS gains access to the gateway and becomes visible in the overview.

When the gateway is online, RMS provides direct access to it.

Under the *Actions* field it is possible to access different applications:

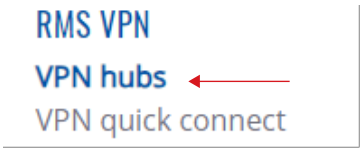


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1	The gateway information page	**2**	Device WebUI interface
3	Device CLI interface	**4**	Device Configuration

For details on these features, refer to the Teltonika Networks RMS cloud solution help page.

7. Head to the *RMS VPN* section on teltonika-networks.com, within RMS and select *VPN Hubs* to create the VPN connection. Alternatively, select *VPN Quick Connect* (not covered in this application guide).



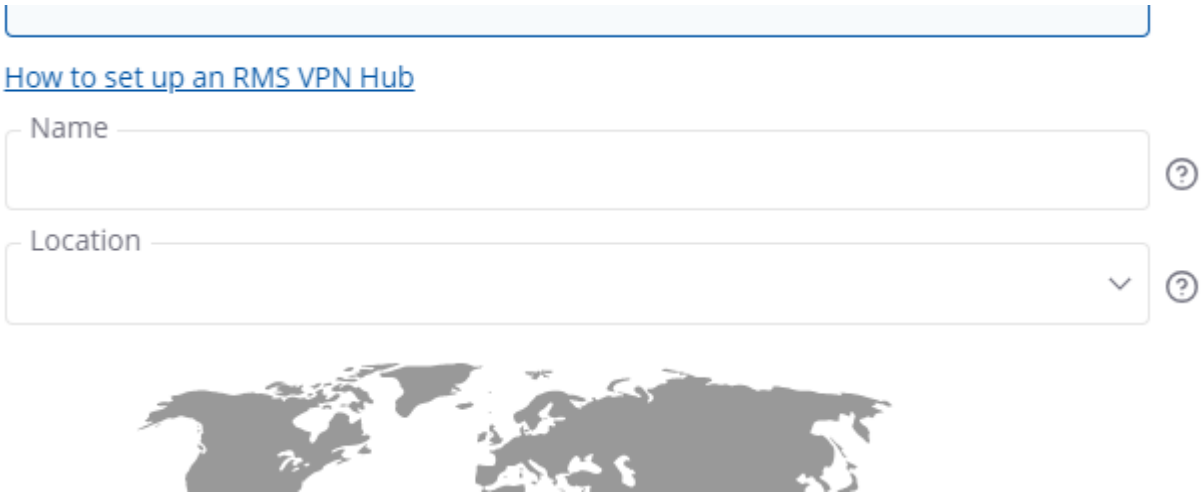
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8. To create a new VPN Hub, click *Add* in the upper left corner.



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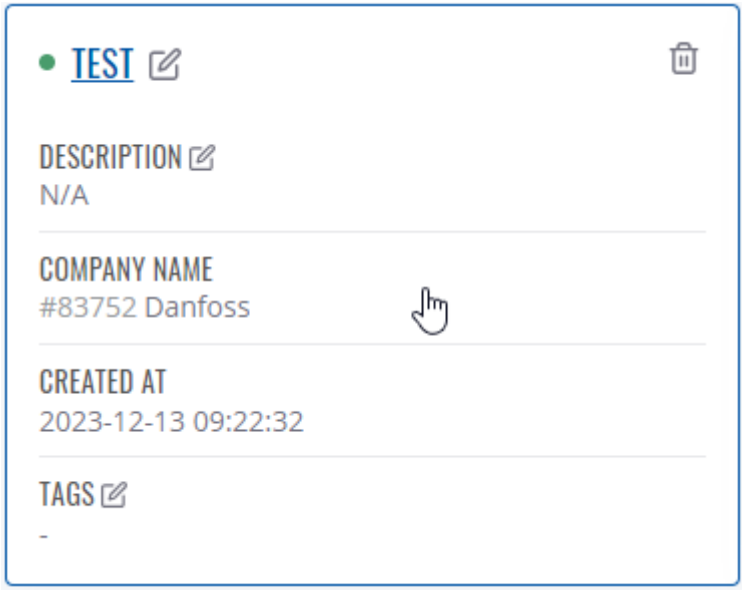
9. In the new VPN Hub window, enter a name and select the Teltonika Networks server location that will host the VPN connection.



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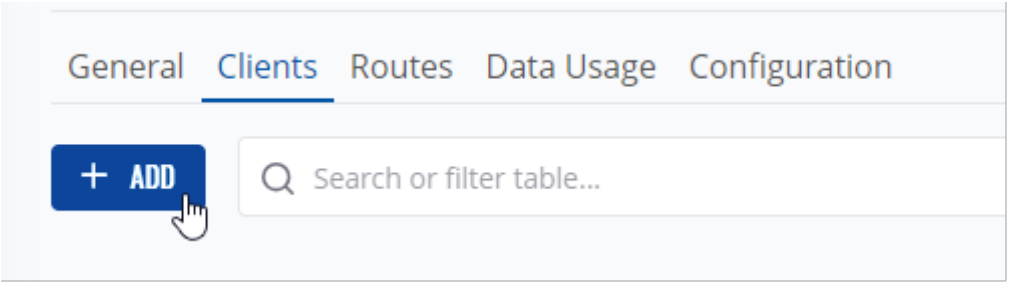
To establish the VPN Hub, click the *Create* button. The VPN Hub is created within seconds.

10. Click the newly created VPN Hub to access its advanced settings. In the below example the VPN Hub created has the name *Test*.



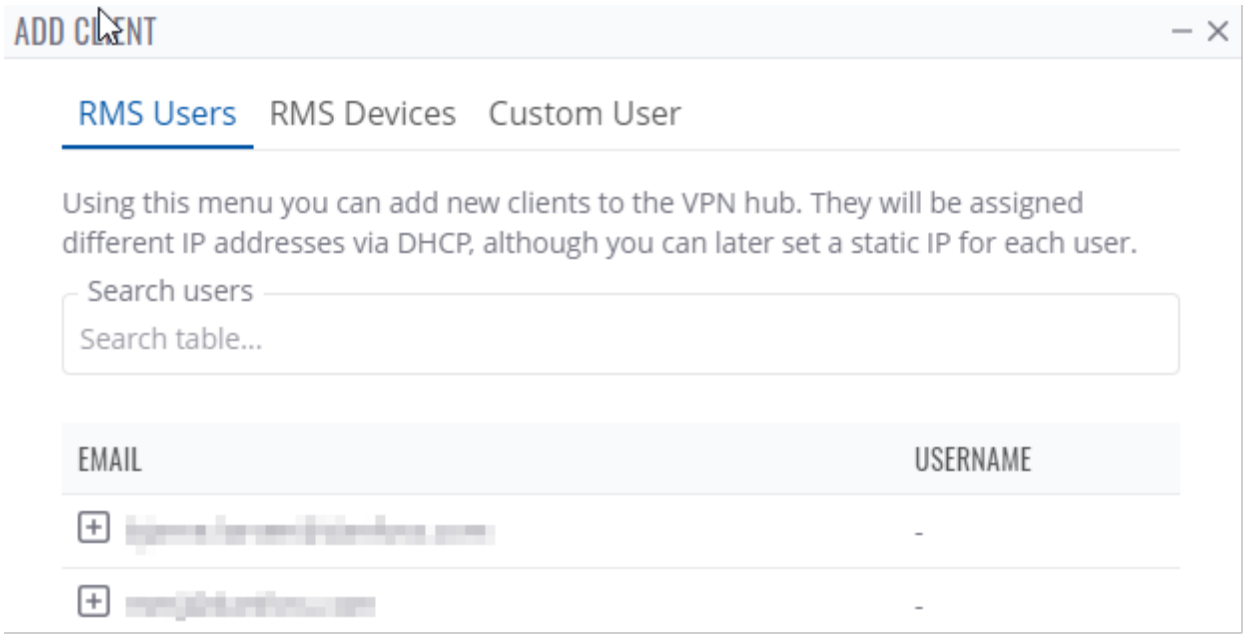
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11. Navigate to the *Clients* tab on the VPN Hub configuration screen and click the *Add* button.



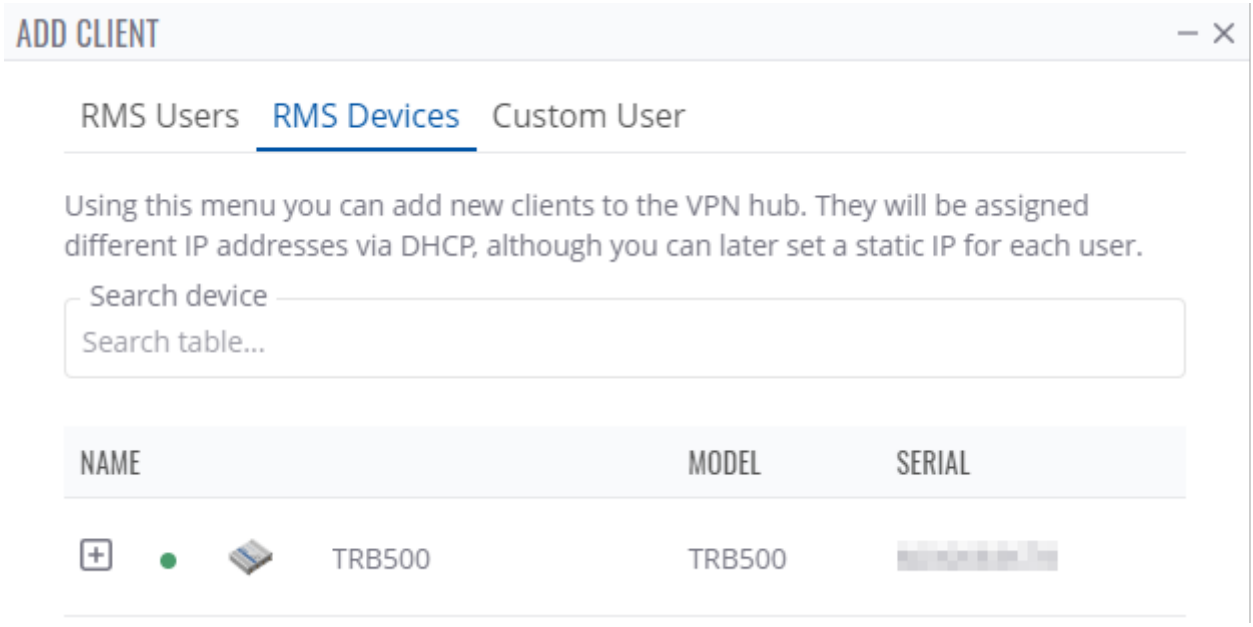
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12. In the *Clients* list, add both the gateway and at least one user. To grant access to the Danfoss iC7 drive connected to the gateway, add multiple users. Navigate to the *RMS Users* tab to add users to the VPN connection. Click the + icon to add a user to the VPN connection.



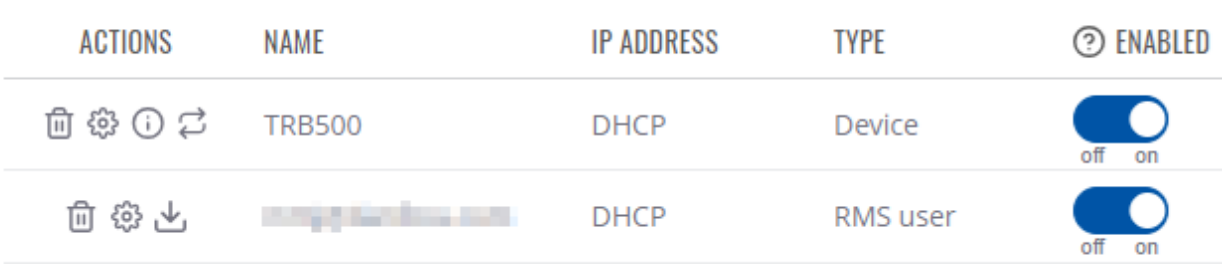
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13. Select the tab *RMS Devices* to add the gateway to the VPN client. Click the + icon to add the device to the VPN connection.



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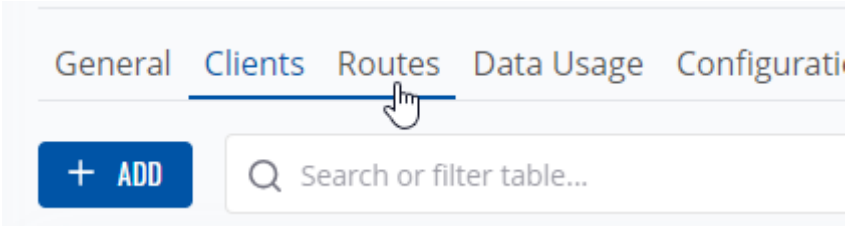
14. Navigate to the overview to verify that both the user(s) and the device are now connected to the VPN Hub.



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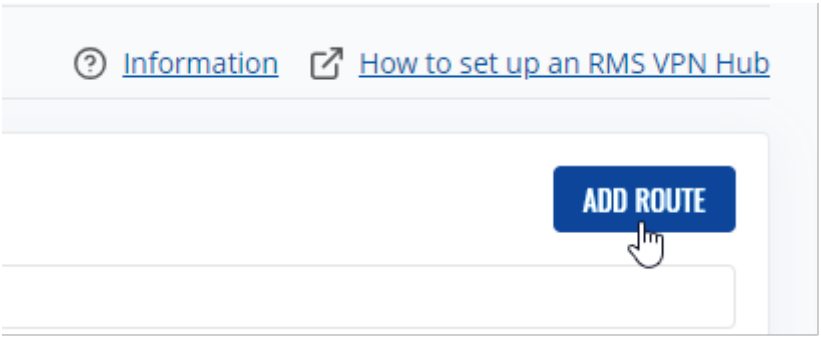
15. Click the download button (shown by the downward arrow icon) to download the OpenVPN configuration file to the PC where you want to establish the VPN connection. Save the file in a convenient location on the PC, as it is needed for setting up the VPN connection.

16. Now, to configure routing between the gateway and the drive, navigate to the *Routes* tab.



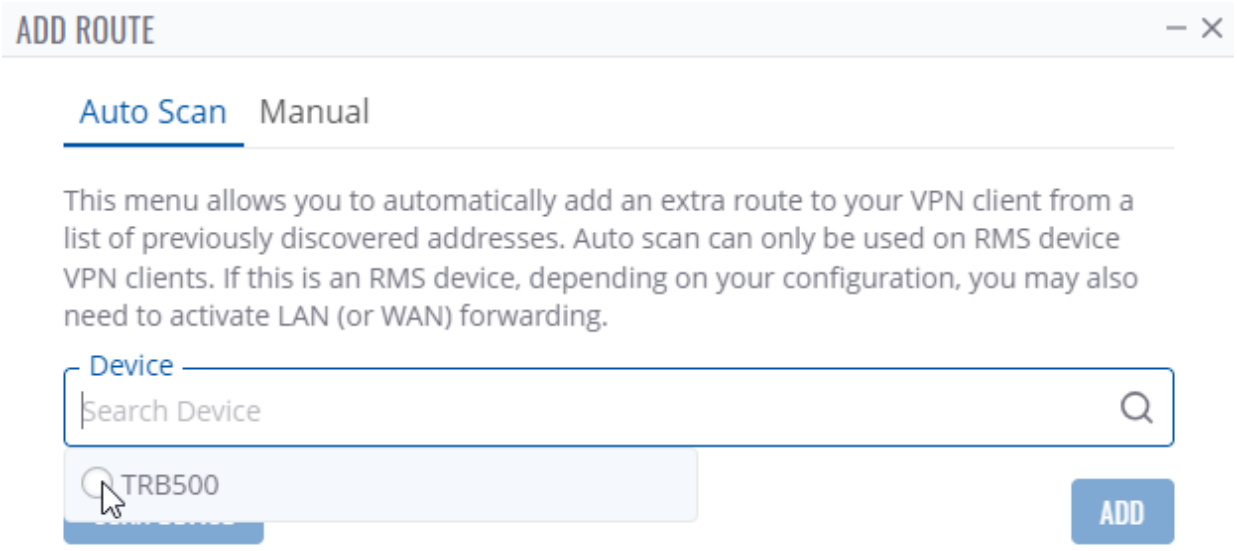
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17. In the Routes interface, the routing table needs to be created for the iC7 drive(s) connectivity via the VPN channel. Click the *ADD ROUTE* button to configure the routing.



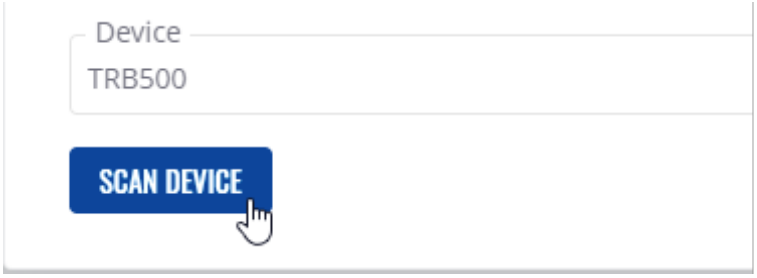
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18. In the pop-up window, select and click in the *Device (Search Device)* field. Then, select the listed gateway to configure its routing table.



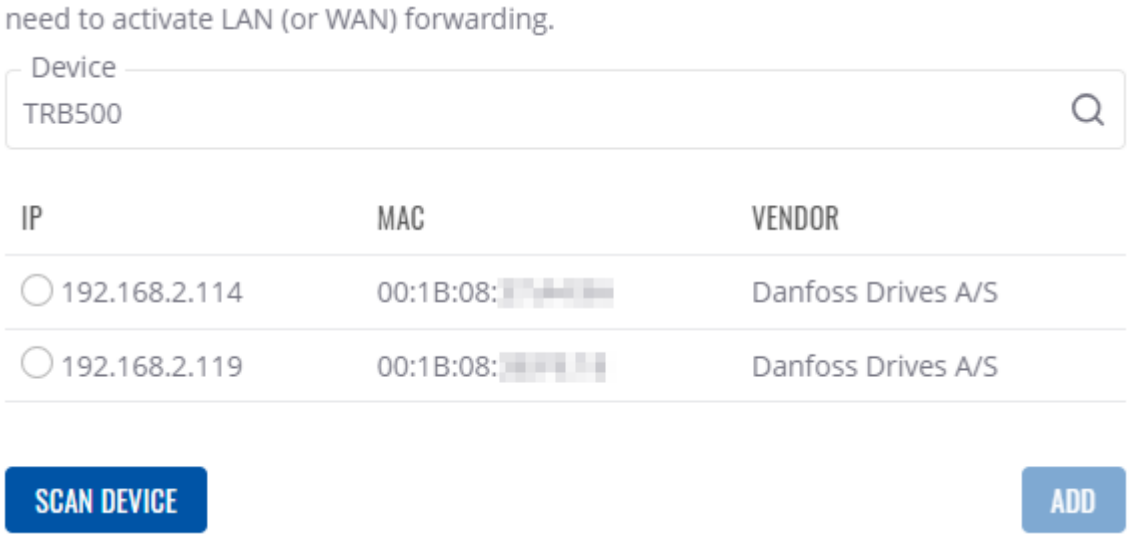
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19. Click the *SCAN DEVICE* button to show the Danfoss iC7 drive(s) connected to the gateway.



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20. A list of available Danfoss iC7 drive(s) will be displayed.



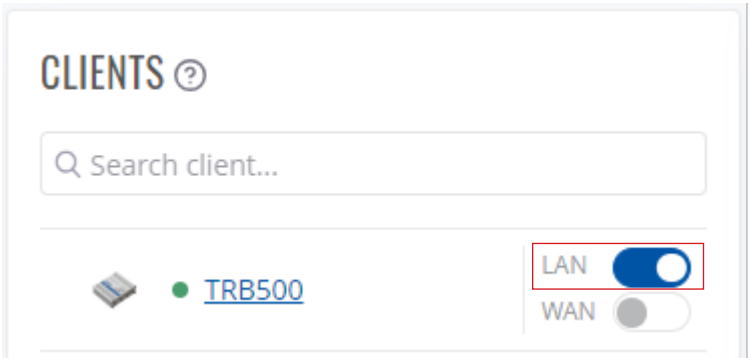
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21. Select the Danfoss iC7 drive you want to establish routing for and click the *ADD* button.

NOTICE

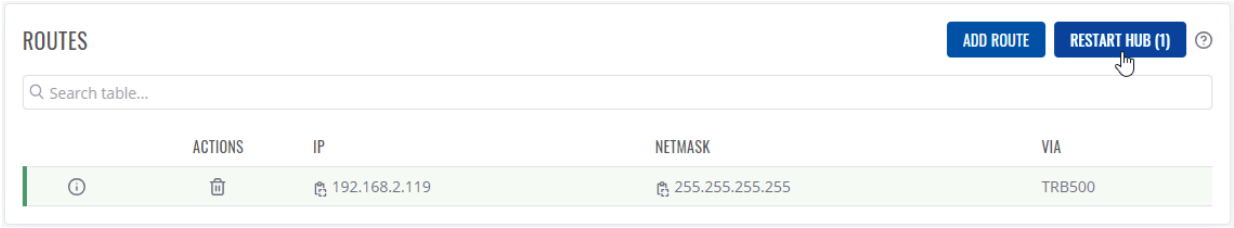
- The Danfoss iC7 drives receive their IP addresses automatically from the gateway's DHCP Server. However, as a prerequisite (described in Step 4), configure the IP address assignment for port X0 on each Danfoss iC7 drive to *Automatic*.

22. In the *Clients* section, Toggle the *LAN* button, to enable routing for the LAN part in the gateway.



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23. After configuring routing, remember to restart the VPN Hub. Click the *RESTART HUB (X)* button in the upper left corner.



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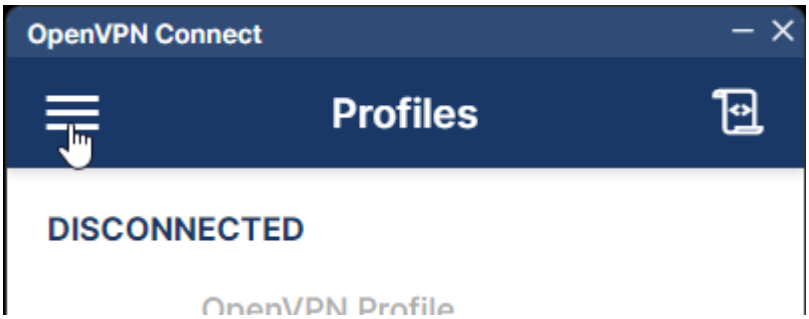
The VPN configuration within RMS is complete. Enable the VPN connection using the OpenVPN client tool and access the Danfoss iC7 drive through the MyDrive® Insight tool.

24. Launch the OpenVPN Connect client application, or any other compatible OpenVPN client.



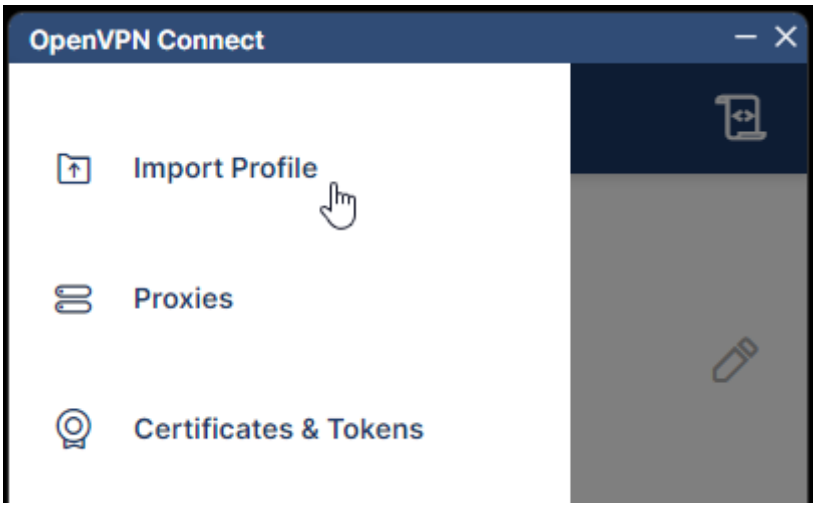
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25. Click the settings button on the top left corner of the OpenVPN Connect client application.



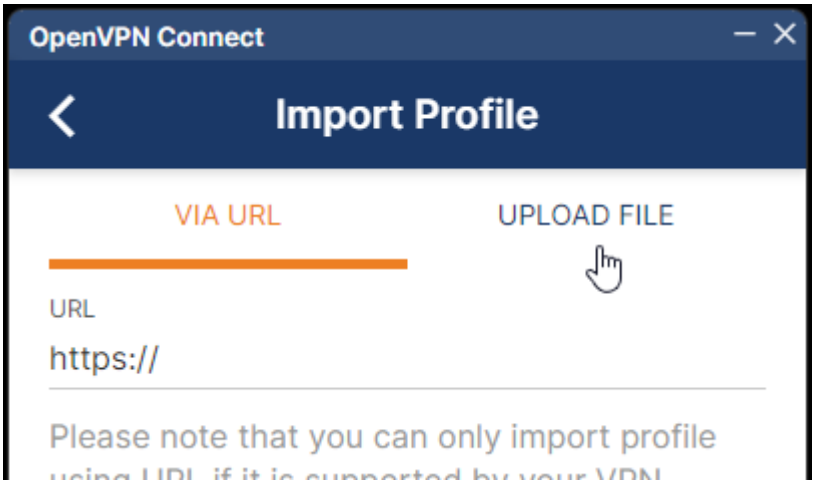
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26. Select *Import Profile* from the drop-down menu.



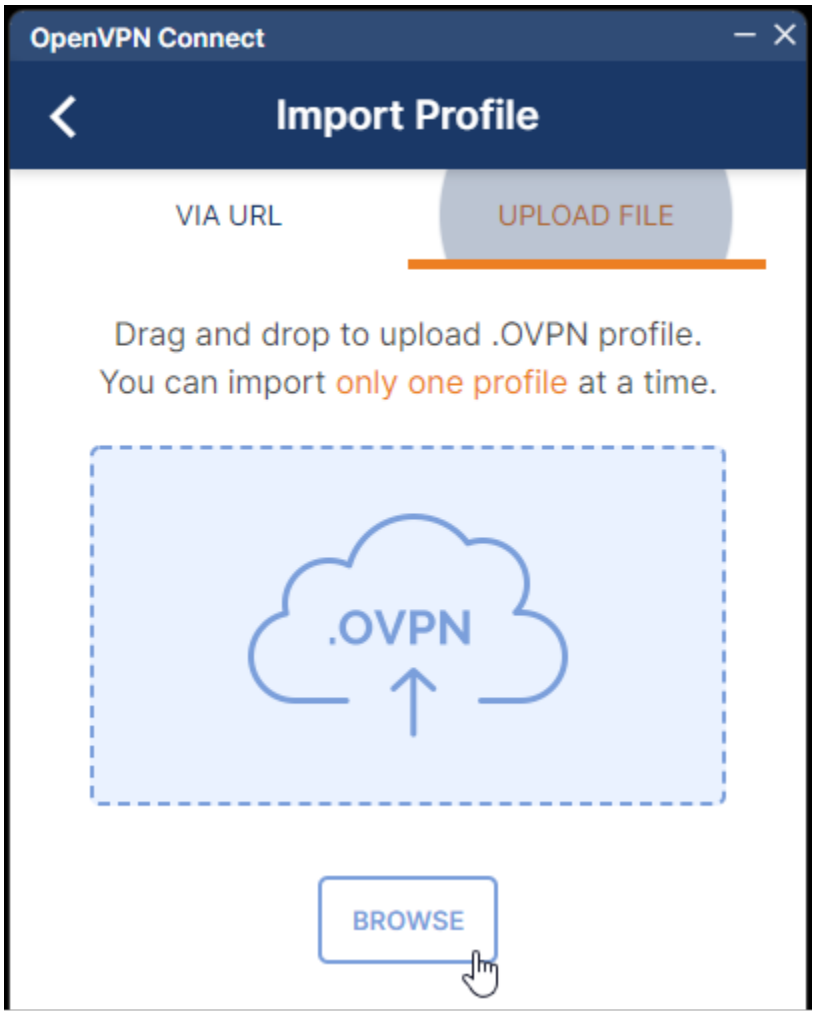
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27. Navigate to the *UPLOAD FILE* tab on the next screen.

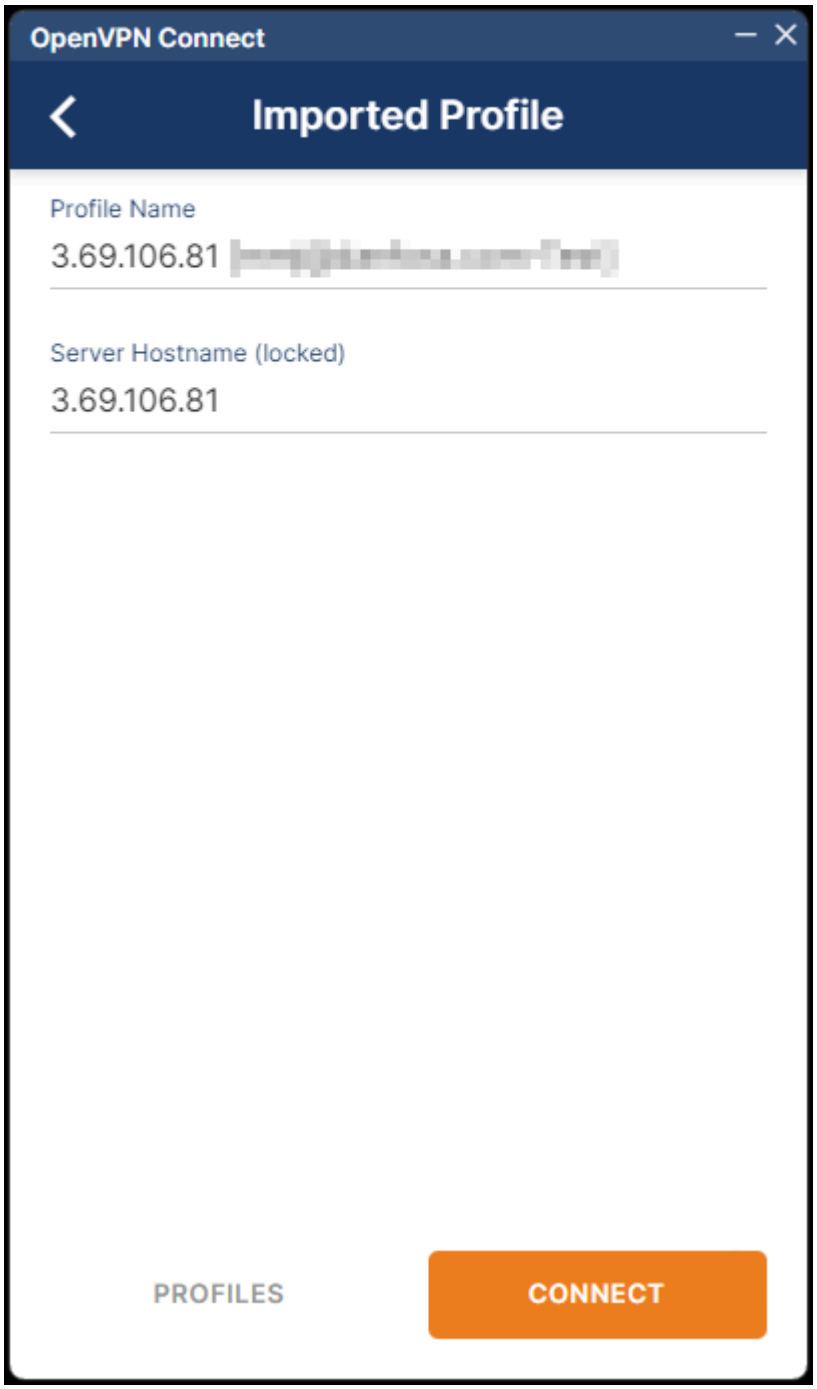


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28. Browse or drag and drop the VPN configuration file from RMS, which was created in Step 15, to this screen.

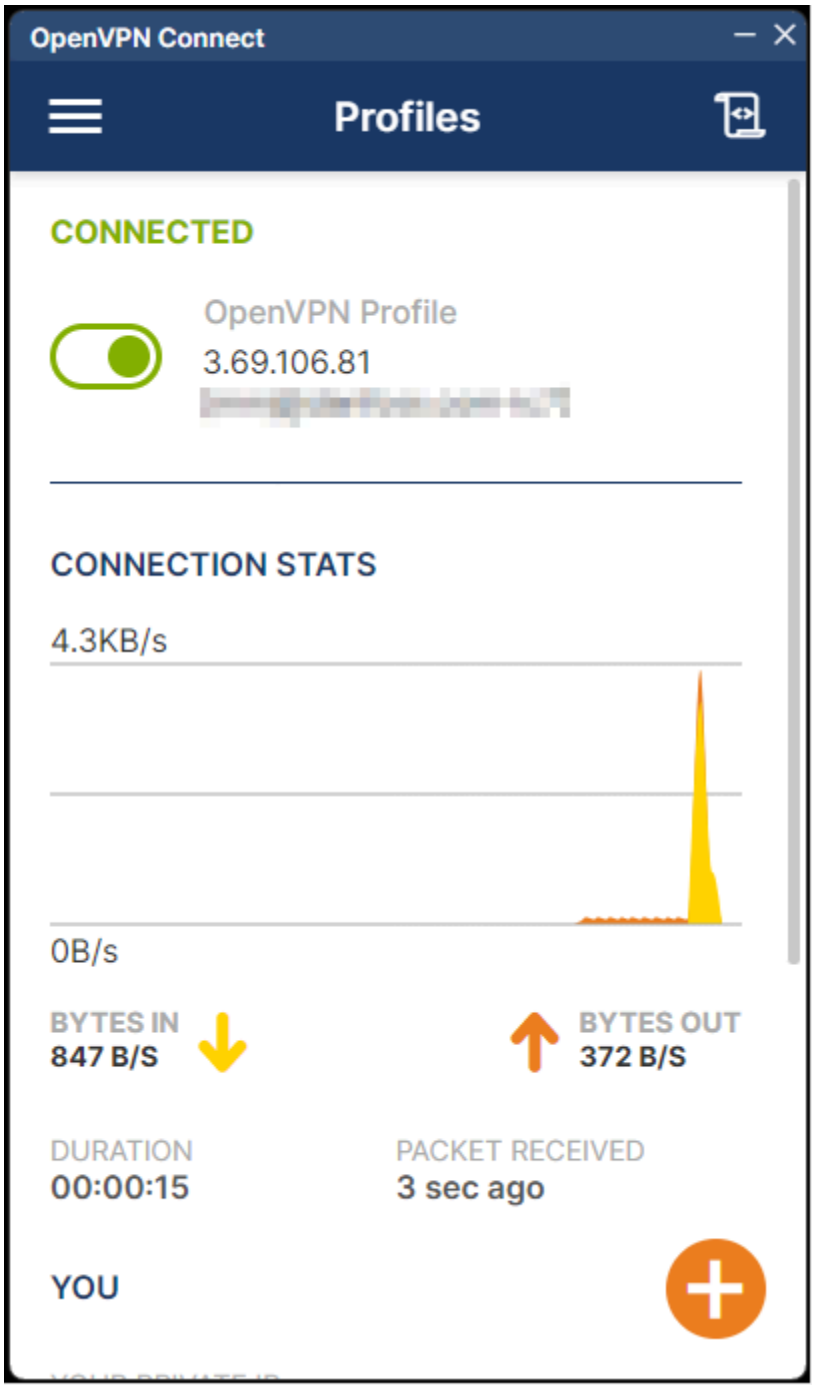


29. The VPN connection details are displayed once the file is imported. Click the *CONNECT* button to establish the VPN connection with the gateway.



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30. Once the VPN connection is established, a similar screen will appear.

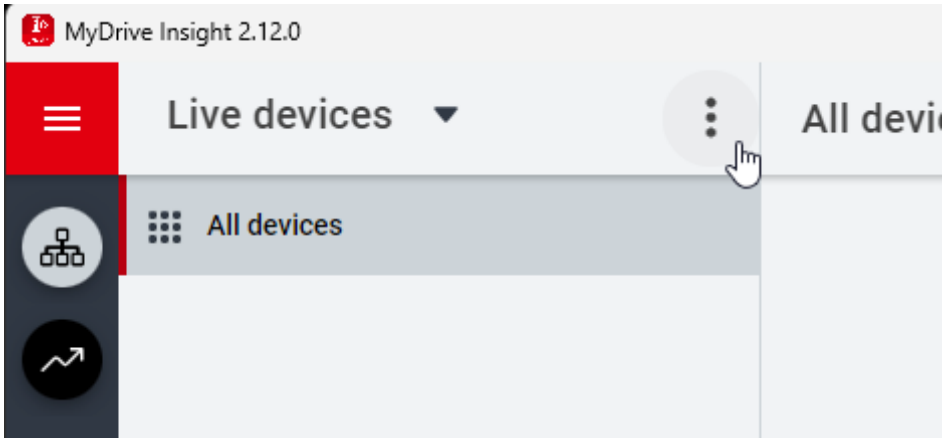


NOTICE

- The OpenVPN Connect application remembers the configuration. After the initial import, simply toggle the connect/ disconnect button in future sessions. It is not necessary to import the configuration file again.

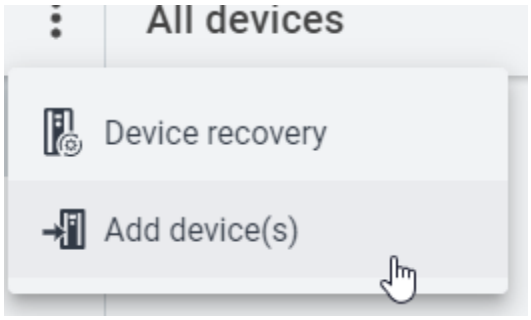
31. Once the VPN connection is successfully established, open the Danfoss MyDrive® Insight application.

32. In the MyDrive® Insight application, click the *More*icon



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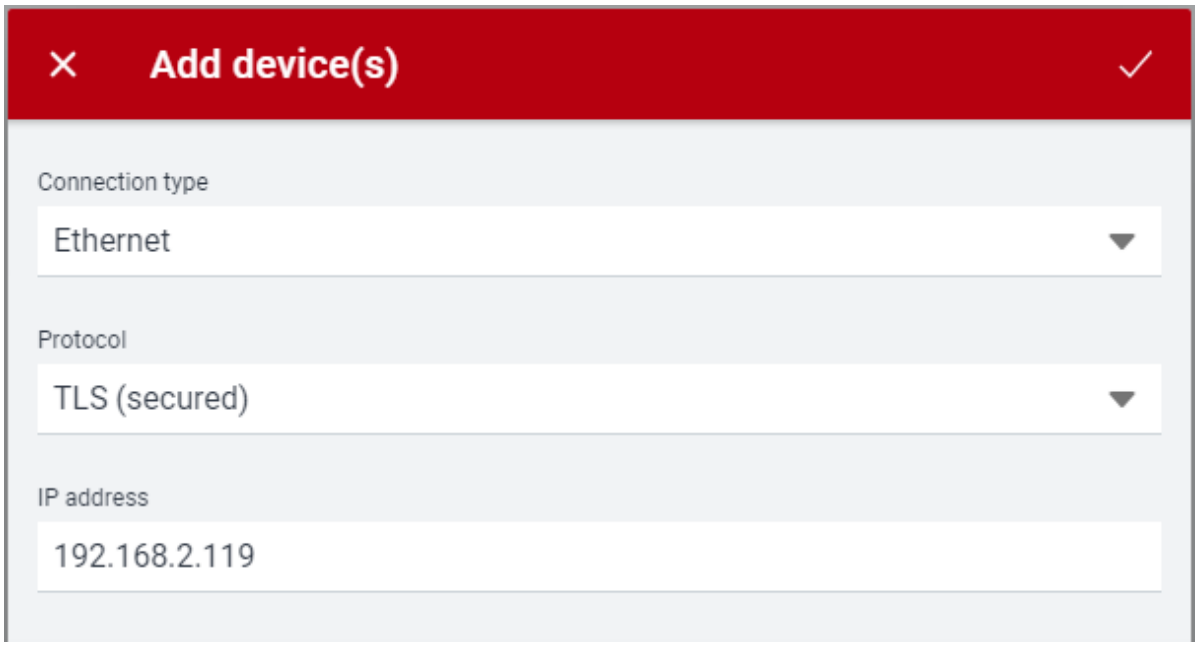
33. Select *Add device(s)* from the drop-down menu.



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34. On the next screen, configure the following settings:

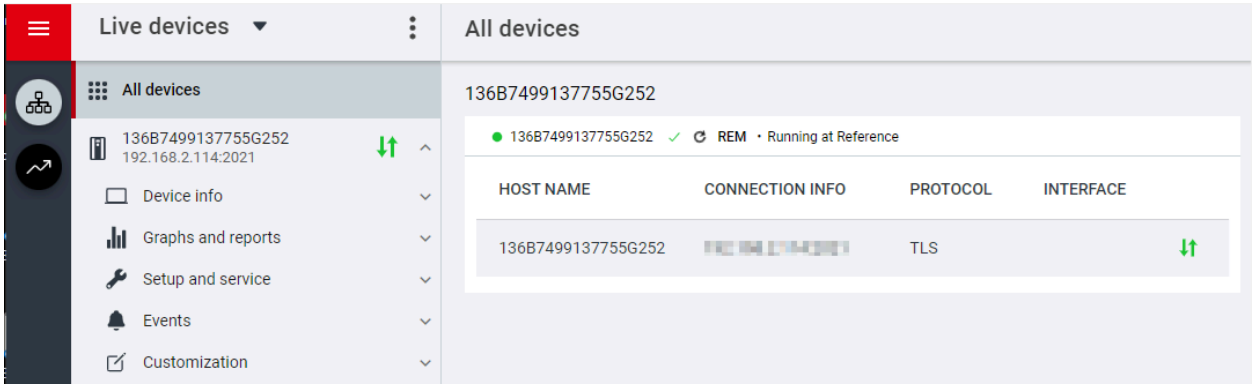
- Set *Connection type* to *Ethernet*.
- Set *Protocol* to *TLS (secured)*.
- The *IP address* field should be filled with the address configured in the routing table during step 23.



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35. Click the check mark icon on the top right corner to save changes.

36. Once the connection from Danfoss MyDrive® Insight is established to the drive, the online information is visible, same as with a local connection.


Live devices
All devices
All devices
136B7499137755G252
192.168.2.114:2021
Device info
Graphs and reports
Setup and service
Events
Customization
136B7499137755G252
136B7499137755G252
REM
Running at Reference
HOST NAME
CONNECTION INFO
PROTOCOL
INTERFACE
136B7499137755G252
TLS

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4 Security Considerations

When the gateway from Teltonika Networks is only used as a remote connection to the iC7 drive as described in this guide, the security considerations are similar to other gateway solutions with access to the mobile network. Since Teltonika Networks relies on standard VPN components for most security features, here is what one must ensure:

- Keep your RMS cloud solution login credentials confidential. Do not share them with anyone.
- Store the OpenVPN configuration file locally on your device and do not share it with others. Since, the file contains login credentials for the VPN Hub.
- All passwords must have 10 characters or more. Avoid dictionary words.

NOTICE

- The VPN gateway bridges 2 separate networks, allowing any host on 1 network to access the other. The PC client should create a virtual network adapter and be the only host on that client-side network.

The gateway bypasses all IT network security and firewalls, and may need security patches installed, so ensure that the network administrator has authorized the installation of the gateway, and that it is maintained and kept up to date.



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