

Osprey Lite®

Power Quality Recorder Software

User Manual

Version 5.7



CT LAB (Pty) Ltd
PO Box 897, Stellenbosch, 7599, South Africa
15 Termo Lane, Techno Park, Stellenbosch, 7600, South Africa

Tel: +27 21 880 9915
Fax: +27 21 880 1088
Email: info@ctlab.co.za
Web: www.ctlab.com



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1 Introduction

Osprey Lite is a software suite accompanying CT Lab's ImpedoDUO, Vecto II and Vecto III power quality instruments. Osprey Lite connects to the ImpedoDUO by LAN or WAN using TCP/IP based communication over Ethernet, Wi-Fi, or a 3G modem. Osprey Lite is used to:

- Configure the instrument remotely by an Internet connection.
- Download recorded data.
- Display real-time data.
- Manage data on the instrument (e.g. deleting unwanted data)
- Manage the database on the local computer on which Osprey Lite is installed.
- View and analyse trends of parameters and waveform events.
- Generate PQ and other reports.

The ImpedoDUO is the successor of the Impedograph power quality recorder developed by CT Lab. It houses two 3-phase meters in a single instrument. In addition to being an IEC 61000-4-30 Class A PQ recorder, it can also be used as a Phasor Measurement Unit (PMU), SCADA transducer (IEC 61850) and a Class 0.2 bill check meter. The ImpedoDUO has a multi-touch display which can be used to configure the instrument. Alternatively, Osprey Lite can also be used to configure the instrument.

The Vecto II is the successor of the Vectograph. However, unlike the Vectograph, the Vecto II also measures current and is fully IEC 61000-4-30 Class A (Ed 3.0) certified. The Vecto II does not have a multi-touch user interface, and is fully configured by Osprey Lite.

The Vecto III is the successor of the Vecto II. It includes all the functionality of the Vecto II. Additionally, it has built-in WIFI and the capability to carry an on-board 3G modem. For the purposes of this document, except where explicitly differentiated, all instruction concerning the Vecto II is also directly applicable to the Vecto III.

Osprey Lite also caters for Vectographs and Provographs although only for a subset of the above functionality – similar to the legacy PQRM software suite. This document focusses mainly on the functionality available for the ImpedoDUO and Vecto II / III.

If there are aspects not addressed in this manual, please consult the Osprey Lite FAQ:

www.ctlab.com/faq

Bugs, issues and feature requests can be logged at:

qa.ctlab.com

2 Getting Started

2.1 Document Conventions

- **Bold face** is used to highlight UI elements
- Parent-child menu selection is indicated with the symbol →, e.g. **Parent → Child**, where it is understood that the function “Child” is found under the parent menu item called “Parent”.
- A tab on a selected function is indicated with a colon, e.g. **Parent → Child : Tab2** implies that there are a tab named Tab2 on the Child function under the heading Parent in the navigation menu.

2.2 Installation

Osprey Lite is distributed as a self-contained setup file. It runs on Microsoft Windows XP or above. Microsoft.Net 4.0 and Silverlight 5 are required prerequisites. A Firebird 2.5 database is used to store the configuration of instruments and the data retrieved.

The Firebird database is shipped with the installation software and automatically installed if not detected on the host computer. Osprey Lite uses network communication and if a firewall is active on the host computer and/or network, Osprey Lite requires permission to listen and communicate on **ports 27030 to 27045**. These ports must be open on the network between the host computer and the instrument.

Osprey Lite consists of 2 components:

- A local server running as a Windows service,
- A user interface implemented as a Silverlight application and operated in an out-of-browser mode.

The Windows service is installed as an Osprey Lite Service and should be visible in the Window’s Services control application. It must be running in order for Osprey Lite to function. This service is configured by default to start automatically. The user may change this to manual, implying that before the user interface (GUI) can be used the user has to start the service manually.

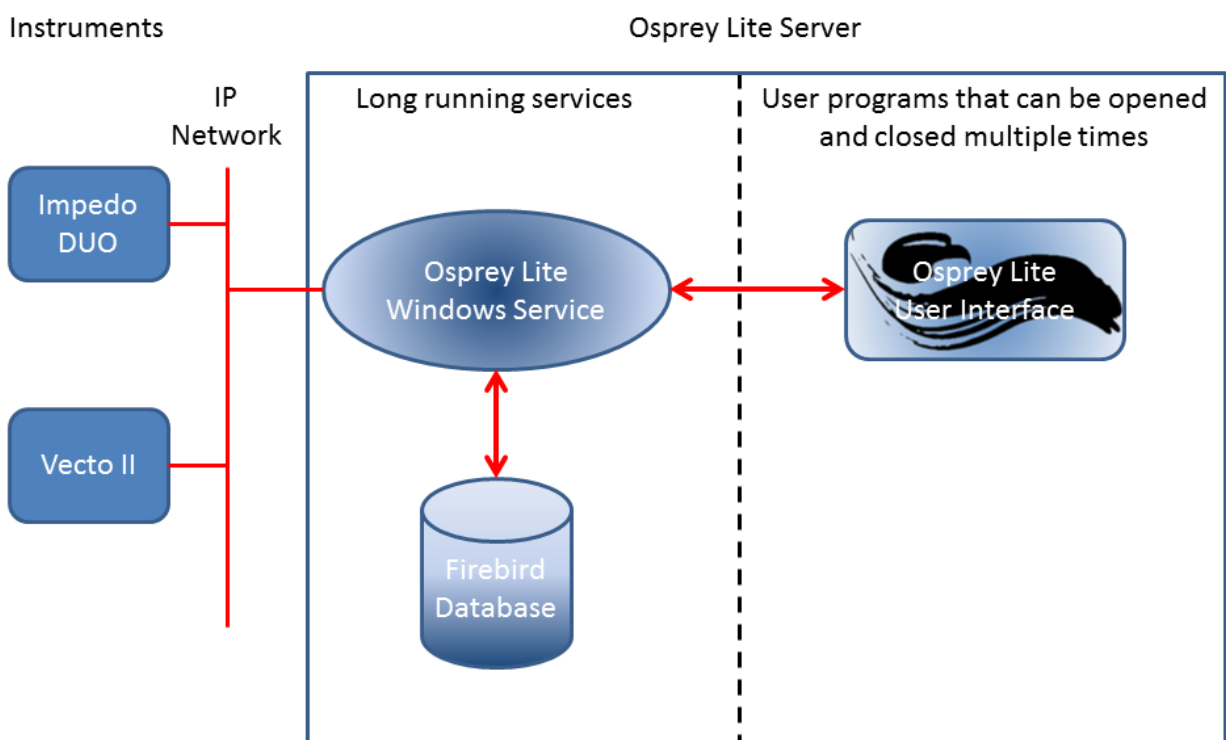


Figure 1: Osprey Lite Layout

2.3 Access Control

The default installation provides no security restrictions on the use of Osprey Lite. Some Osprey Lite functions can be password protected. To enable this function, place a file containing the password in:

```
[install location]\CT Lab\Osprey Lite\bin\ospreypass.txt
```

The password file should only contain the password, where whitespace before or after the password will be ignored.

2.4 Osprey Lite GUI Layout

A typical Osprey Lite layout configuration is shown in Figure 2. The left panel is used to navigate the application and select a specific type of function, for example data download or trend viewing. Most functions have a middle view, where the meter point or instrument to which the function applies is selected. The right panel contains the details of the selected function.

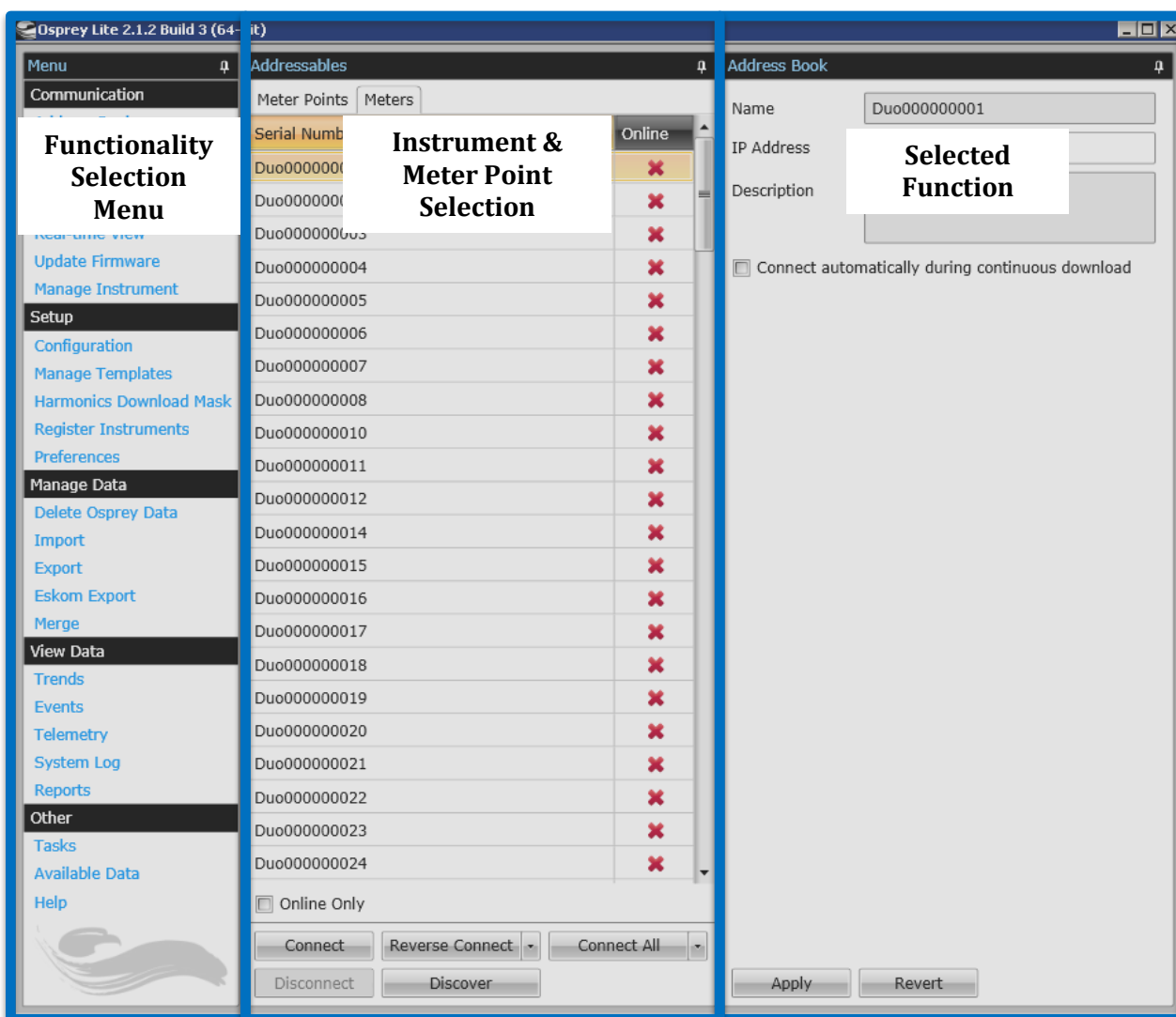


Figure 2: Typical Osprey Lite layout

The navigation menu is divided into 5 logical components:

Communication:	Functions that require communication with the instrument
Setup:	Configuration of Osprey Lite and Instruments
Manage data:	Management of the Osprey Lite database
View Data:	View different types of historic data
Other:	Functions that do not fit in any of the categories above

The instrument and meter point selection panel is used to select which instrument or meter point the current selected function applies to. This panel is not present for most but not all functions. The panel typically has two tabs, one for selecting meter points and the other for selecting meters.

The **Meters** tab allows selection by instrument serial number and is convenient if when the serial number is known. The **Online** column shows a red cross if the instrument is offline or a green circle with a checkmark when the instrument is online.

The **Meter Points** tab allows selection by meter point name. It also shows the instrument to which the meter point was last attached in a second column. Note, for the ImpedoDUO two meter points can be attached to the same instrument. Also note that the **Meters** tab is the only method to select a function for an instrument to which no meter points are attached. The **Online Only** checkbox allows a quick filter to show only instruments or meter points that are currently online.

2.5 Registering an Instrument

Each instrument has a unique key associated with it. This key must be entered into Osprey Lite before Osprey Lite and the instrument will trust each other and allow communication. An instrument's key file will be shipped with it, but should it be lost it may be requested from the manufacturer.

To register an instrument in Osprey Lite:

- 1) Open Osprey Lite and select **Setup → Register Instruments** using the navigation menu on the left (see Figure 2).
- 2) Next, click on **Browse** and select the desired key file(s) using the file browser (key files are named [serial].key, e.g. Duo000000001.key). Click **Open** to prepare the key to be loaded. The selected instrument should now be listed.
- 3) Click **Register** to register the instrument in Osprey Lite. The instrument should now be listed in the middle panel when **Setup → Address Book** is opened and **Meters** is selected.

3 Security

3.1 Windows Authentication

Windows Authentication is used to enforce access to GUI with authentication via Active Directory. For this purpose, there should be 3 groups added to the Active Directory domain. The groups are:

- CT LAB PQ Analyser System Admins
- CT LAB PQ Analyser Admins
- CT LAB PQ Analysers

Windows Authentication can be enabled in the Preferences Menu. Once enabled, access to the Osprey Lite UI will be restricted. Domain users that should be able to access Osprey Lite, must be part of the “CT LAB PQ Analysers” group. Beyond this level of security, finer grained access is controlled with the use of a Write Password.

3.1.1 Enable Windows Authentication

Anyone can enable Windows Authentication with the GUI.

- 1) Navigate to **Setup → Preferences**.
- 2) Check the **Enable Windows Authentication** checkbox and click [Apply].
- 3) Close and reopen the GUI to allow Windows Authentication to initiate.

3.1.2 Disable Windows Authentication

Only users belonging to the “CT LAB PQ Analyser System Admins” domain group can disable Windows Authentication within the GUI. These users do not need the Write Password for access and can thus recover a lost Write Password.

- 1) Navigate to **Setup → Preferences**.
- 2) Uncheck the **Enable Windows Authentication** checkbox and click [Apply].
- 3) Close and reopen the GUI to allow Windows Authentication to be removed.

3.2 Write Password

The Write Password is used to limit access to menu items that allows for predefined Osprey Lite, Meter and Meter Point data and configuration manipulation. This list of menu items protected with the Write Password includes:

- **Communication → Delete Meter Data**
- **Communication → Manage Instrument**
- **Setup → Configuration**
- **Setup → Preferences**
- **Manage Data → Delete Osprey Data**
- **Manage Data → Merge**

If Windows Authentication is enabled, and a valid Write Password is not supplied when opening the GUI, the remainder of the menu items will remain accessible. The Write Password can however be supplied at any time during a GUI session, by clicking on the “Enter Write Password” menu item that appears at the bottom of the menu.

3.2.1 Enable / Disable Write Password

During initial setup the Write Password can be set and activated using the Use Write Password in the preferences screen.

- 1) This password is required for write operations and access to Osprey Lite when Windows Authentication (LDAP) is active, and the user belongs to “CT LAB PQ Analysers” or “CT LAB PQ Analyser Admins” and the Use Write Password flag is set.
- 2) Users belonging to “CT LAB PQ Analysers” may not change the Write Password.

- 3) Users belonging to “CT LAB PQ Analyser Admins” may change the Write Password and may also disable the Write Password function.

3.3 Perform Login

Once Windows Authentication has been enabled, the GUI will show a Login window if no active session is present.

- 1) Under the **Windows Authentication** section, enter the **Domain\Username** and **Password** and click **Login**.
- 2) The **Username** and **Password** fields under **Instrument Authentication** are optional at this stage. See section 3.3.3 for more info.

Upon successful login, the Osprey Lite Service will have created a session. This enables the following GUI options under **Communication → Manage Instrument**:

- **Set Instrument User**
 - Add/Edit a local user on one or more instruments
- **Get Instrument Users**
 - Get all local users on the selected instrument
 - Select one or more local users to delete from one or more instruments.
- **Fleet Settings** (Can be applied to one or more instruments)
 - Enable / Disable instrument authentication model with Radius credentials
 - Enable / Disable SNMP Server Settings
 - Save Fleet Password (see section 4.1)
 - Set Inactivity Period

Enabling authentication with a Radius server as 0.0.0.0 will disable checking the Radius server and only use local username/password credentials for authentication.

3.3.1 Perform Unlock

Closing the GUI without logging out (see section 3.3.2) will result in the Osprey Lite Service persisting the session, thus allowing instruments utilising authentication to continue communicating in the background. Re-opening the GUI will result in the Locked window being shown:

- 1) To unlock, under the **Windows Authentication** section enter the **Password** and click **Unlock**.
- 2) To logout, click **Logout**.

3.3.2 Perform Logout

Once logged in, the GUI will show a menu item below **Other** like as **WELCOME <UserName>**.

- 1) Click this link to access the Logged In window.
- 2) Click **Logout** to close the GUI.

This will terminate the Osprey Lite Service session created during login (see section 3.3), which will cause instruments utilising authentication to stop communicating upon next login.

3.3.3 Enable Instrument Authentication

Instrument authentication requires a username and password to be set within the Osprey Lite GUI. This can be done during login (see section 3.3), or after login whereby these steps apply:

- 1) Click on the link below the menu titled like “WELCOME <UserName>”.
- 2) Under **Communication → Manage Instrument : Instrument Authentication**, enter the **Username** and **Password** fields and click **Save**.

At this point, all instruments will be disconnected from Osprey Lite to allow the new credentials to come into effect.

3.3.4 Default Administrative User

All instruments contain a default administrative user with username “admin” and password “admin”. For security this password should be changed when enabling authentication using **Communication → Manage Instrument : Set Instrument User**.

3.3.5 Password Strength Indication

All passwords captured within the GUI are case sensitive. Password strength is indicated as the background colour of the input control. There are three levels, i.e. colours:

- 1) Red – Password is shorter than 8 characters.
- 2) Orange – Password does not contain:
 - a. At least one uppercase and one lower case letter
 - b. At least one digit
 - c. At least one non-alphanumeric character (e.g., @, %, &, *, etc.)
- 3) Green – Password has all aforementioned rules applied.

3.3.6 Pre-populate Domain Name

The domain name used during login (see section 3.3) can be pre-populated as a convenience feature:

- 1) Locate the *Osprey.Light.Services.Host.Console.exe.config* file within *%PROGRAMFILES%\CT Lab\Osprey Lite\bin* directory.
- 2) Locate the *<appSettings>* section within the file and add a key similar to this:
 - a. *<add key=" OspreyDomain" value="YourDomainName"/>*
- 3) Save the file and Restart the Osprey Lite Service from the start menu.

Osprey Lite Service should always have access to the file.

4 Communication

4.1 Fleet Password

Communication between Osprey Lite and the ImpedoDUO or Vecto II is secured with encryption. This encryption is dual-fold, meaning that both the instrument and Osprey Lite should be able to trust each other. This is implemented by both the instrument key and a system-wide fleet password that must be entered into Osprey Lite and all instruments that it communicates with.

4.1.1 Setting the fleet password

A default fleet password is supplied with a fresh Osprey Lite install and is entered by default into a factory reset ImpedoDUO or Vecto II. To enter a new fleet password into Osprey Lite:

- 1) Select **Setup → Preferences** and unselect **Hide Fleet Password**
- 2) Enter the new password into the textbox labelled **Fleet Password**
- 3) Click **Apply** to accept the password
- 4) The same password has to be entered as fleet password on instruments that have to communicate with this Osprey Lite installation

Note that Vectographs and Provographs do not use a fleet password.

If a new instrument with a default fleet password is to be added and Osprey Lite has a non-default fleet password set, communication with the instrument will fail. In this case it is possible to connect to the instrument using the button **Default Password Connect** under the menu item **Communication → Manage Instrument**.

4.1.2 Resetting a forgotten fleet password on ImpedoDUO or Vecto II

In the case that the fleet password was incorrectly entered, or forgotten it can be reset via the user interface directly on the ImpedoDUO. Alternatively, and the only option for the Vecto II is to reset it via the USB port as follows:

- 1) Format a USB stick with the FAT32 file system
- 2) Create a directory in the root folder of the device called `ResetFleetPassword`
- 3) Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Duo000000001.key`
- 4) Insert the USB stick into the device to be reset
- 5) The reset action should be complete within 30 seconds, and the default fleet password will be restored and employed for all subsequent connections

This procedure will also reset the admin user on the instrument.

4.2 Establishing an Instrument Connection

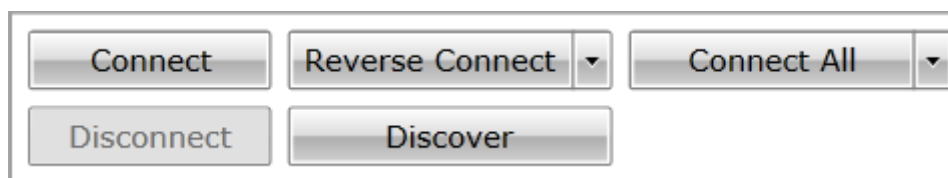


Figure 3: Communication Command Buttons

An ImpedoDUO may be configured to communicate with Osprey Lite in either forward mode (Osprey Lite establishes the connection), or reverse mode (the instrument established the connection). In forward connection mode the instrument's IP address must be known. In reverse connection mode, either the host computer's address must be known, or the instrument must be discoverable on the LAN. Vectographs and Provographs only support forward mode.

4.2.1 Discovering Instruments

To discover all instruments on the LAN:

- 1) Select **Communication → Address Book**
- 2) Click **Discover** in the instrument selection panel
- 3) All instruments that are accessible (i.e. for which the network rules allow it) will connect to Osprey Lite
- 4) The IP address of the instrument will be filled into the address book automatically

4.2.2 Setting an Instrument's Address Manually with Osprey Lite

The following steps explain the procedure to set the IP address that Osprey Lite uses to connect to an instrument:

- 1) Select **Communication → Address Book**
- 2) Select the desired instrument
- 3) Enter the instrument's IP address and select **Apply**.
- 4) Connect to the instrument by selecting **Connect** in the middle panel.

Once the instrument logged into Osprey Lite, the red cross in the **Online** column in the middle panel will turn into a green circle.

4.2.3 Forward and Reverse Connections

The connection can be established in one of two modes: a forward connection and a reverse connection. In the Instrument Selection Panel the **Connect** button establishes a forwards connection to the specified IP address. In this mode the connection originates with Osprey Lite and targets the instrument. The **Connect** button will only be enabled if an IP address for the instrument is known.

A request for a reverse connection can be made by clicking **Reverse Connect**. In this mode the IP address of the machine running Osprey Lite is sent to the instrument via UDP. The instrument then tries to connect to Osprey Lite on the IP address it received, but only if it is not connected to Osprey Lite on the given address already. The instrument can also be instructed to drop the current connection and establish a new connection. This function is enabled by selecting the **Force** option on the **Reverse Connect** button. The **Reverse Connect** button will only be enabled if an IP address for the instrument is known.

4.2.4 Auto-Connect

Osprey Lite can be configured to periodically (every ten minutes) download all online instruments (see section 9.6). Osprey Lite can be configured to automatically connect to instruments that cannot reverse connect to Osprey Lite (e.g. Vectographs and Provographs) or are not configured to reverse connect, e.g. when they are configured to connect to another Osprey Lite server. To automatically connect to an instrument during continuous download, select the instrument or one of its attached meter points in the address book (**Communication → Address Book**). Check the checkbox labelled **Connect automatically during continuous download**.

4.2.5 Connect all

To connect to all offline instruments, open the address book (**Communication → Address Book**), and click **Connect All**. The user can choose to connect to all automatically connected instruments (see section 4.2.4) by clicking on the dropdown arrow to the right of the **Connect All** button and checking the checkbox labelled **Automatic connect only**. Unchecking this checkbox will connect to all meters for which an IP address is known.

4.2.6 Configuring the IP Address of an ImpedoDUO or Vecto II

The following steps explain how to use Osprey Lite to set the IP address of a Vecto II or ImpedoDUO remotely:

- 1) Establish a connection to the instrument
- 2) Open **Communication** → **Manage Instrument**
- 3) Select **Manage Remote Ethernet Settings** and click **Execute**
- 4) The instrument can now be configured to obtain its IP address from a DHCP server, or use a statically assigned IP address
- 5) Once the desired configuration is entered, click **Save**

If the IP address of the instrument is not known, the instrument can be connected on its DHCP port that has a known IP address of 192.168.7.1.

The Impedo DUO uses ETH.1 as its DHCP server port while the Vecto II uses ETH.2

*Note: the instrument serves as a DHCP server on its DCHCP port. Connecting this port to a network with an active DHCP server may result in undefined and possibly harmful behaviour. To use the DHCP server port, connect the instrument directly to a computer configured to either set its own address via DCHP or that has a static address in the IP address range 192.168.7.2 to 192.168.7.254. **Discover** can then be used to connect to the instrument.*

4.2.7 Setting an Instrument's Address Manually with USB Stick

The TCP/IP configuration of the instrument can be configured via USB as follows:¹

- 1) Format a USB stick with the FAT32 file system
- 2) Create a directory in the root folder of the device called `EthernetSettings`
- 3) Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
- 4) To configure the instrument for DHCP server, the folder may not contain a file called `ip`
- 5) To configure the instrument for static IP parameters,
 - a. Create a file in the folder called `ip` with contents the IP address to use, e.g. `192.88.90.11`
 - b. Create a file in the folder called `netmask` with contents the netmask to use, e.g. `255.255.255.0`
 - c. Create a file in the folder called `dns` with contents the DNS server IP address to use, e.g. `8.8.8.8`
 - d. Create a file in the folder called `gateway` with contents the gateway to use, e.g. `192.88.90.1`
- 6) Insert the USB stick into the device to be reset
- 7) The change should be complete within 60 seconds

¹ As of V3.0

4.2.8 Configuring WIFI via Osprey Lite²

The WIFI can be configured as an access point when connected via Ethernet as follows:

- 1) Establish a connection to the instrument
- 2) Open **Communication** → **Manage Instrument**
- 3) Select **Manage WIFI Settings** and click **Execute**
- 4) Select **Enable** or **Disable** to enable/disable WIFI on the instrument
- 5) Select **Access Point** to configure the instrument as an access point. The SSID of the instrument will be its serial number if left blank. If the password is left blank the access point will not require authentication. If set, the password must have at least eight characters.
- 6) Select **Infrastructure** and configure the **SSID** and **Password** to connect to external access point. Leave **Password** empty to connect to an open access point.
- 7) Once the desired configuration is entered, click **Save**

4.2.9 Enabling WIFI via USB²

The WIFI can be configured via USB as follows:

- 1) Format a USB stick with the FAT32 file system
- 2) To configure the device as an access point
 - a. Create a directory in the root folder of the device called `EnableWifiAp`
 - b. Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
 - c. If a non-default SSID is required, create a file in the folder called `ssid` with the contents the SSID to connect to, e.g. `MY ACCESSPOINT`
 - d. If a non-default WPA PSK password is required, create a file in the folder called `password` with contents the password to use, e.g. `superSecret94`
- 3) To configure the device to connect to an access point
 - a. Create a directory in the root folder of the device called `EnableWifiInf`
 - b. Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
 - c. Create a file in the folder called `ssid` with the contents the SSID to connect to, e.g. `MY ACCESSPOINT`
 - d. If the access point requires a WPA PSK password, create a file in the folder called `password` with contents the password to use, e.g. `superSecret94`
 - e. If a WIFI watchdog should be enabled, create a file in the folder called `watchdogaddress` with the watchdog address to use.
- 4) Insert the USB stick into the device to be reset
- 5) The change should be complete within 60 seconds

4.2.10 Configuring Modem via Osprey Lite²

The on-board modem can be configured as follows:

- 1) Establish a connection to the instrument
- 2) Open **Communication** → **Manage Instrument**
- 3) Select **Manage Modem Settings** and click **Execute**
- 4) Select **Enable** or **Disable** to enable/disable the modem
- 5) Select the APN to use (obtained from your cellular network provider).
- 6) If a modem watchdog should be enabled, select the **Watchdog Address** to use
- 7) Once the desired configuration is entered, click **Save**

² Vecto III only

4.2.11 Enabling Modem via USB²

The on-board modem can be enabled via USB as follows:

- 1) Format a USB stick with the FAT32 file system
- 2) Create a directory in the root folder of the device called `EnableModem`
- 3) Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
- 4) Create a file in the folder called `apn` with the APN to use
- 5) If a modem watchdog should be enabled, create a file in the folder called `watchdogaddress` with the watchdog address to use
- 6) Insert the USB stick into the device to be reset
- 7) The change should be complete within 60 seconds

4.2.12 Enabling the HMI (on-board Web Interface) via USB

The HMI (on-board Web Interface) can be enabled via USB as follows:

- 1) Format a USB stick with the FAT32 file system
- 2) Create a directory in the root folder of the device called `MeterKey`
- 3) Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
- 4) Insert the USB stick into the device to be reset
- 5) The change should be complete within 60 seconds

4.3 Troubleshooting

The following steps should be taken if an instrument fails to connect to Osprey Lite

- Ensure that it is possible to ping the instrument:
Open a cmd box (e.g. by typing **cmd** in the start menu) and type “**ping [ADDRESS]**” where **[ADDRESS]** is the IP address of the instrument, e.g. **ping 192.168.7.1**
If there is no response to the ping, either the IP address is wrong or there is an infrastructure problem preventing communication. Osprey Lite will be unable to connect until the instrument responds to a ping
- Ensure that Osprey Lite’s communication ports are not blocked
Software such as antivirus programs or firewalls may interfere with Osprey Lite’s functionality if not properly configured. To ensure that this is not the case, temporarily disable any antivirus software or firewalls (including Windows Firewall), restart Osprey Lite and retry the connection steps. If a connection can now be established, turn on the protection software one by one to determine the offending program. Consult the offending program’s manual to determine how to configure it to allow Osprey Lite to use its required ports (see Section 2.2).
- Sometimes a connection is not picked up by Osprey Lite. Restart the User Interface to ensure that an instrument is truly not connected. This condition is more prevalent on laptops that switched to sleep mode or on long running desktop UI sessions.

5 Meter Point Configuration

A meter point is uniquely identified by the name given to it. If the exact same meter point name (including case and white space) is used somewhere else it is considered to be the same meter point. A meter point name cannot be changed once it is created, but the data can be merged into another meter point under certain conditions (see section 0). Care should thus be taken in assigning meter point names.

5.1 Creating a New Meter Point

A new meter point can only be created by Osprey Lite on an online instrument (i.e. an instrument to which a connection was established). It can also be done directly on an ImpedoDUO by means of the touch screen user interface.

- 1) Select **Setup → Configuration : Meter Point**
- 2) Click **Create** at the bottom of the meter point selection panel
- 3) Select the instrument and meter side where the meter point must be created and click **OK**
- 4) Fill in the meter point details
 - a. The name must be unique across all meters
 - b. The description allows user defined information to be added to the meter point
 - c. The topology influences the expected declared voltage and energy measurement methods
 - d. The voltage level is used to classify the meter point (voltage level is seen as for a delta-connected system)
 - e. The declared voltage is the expected operating voltage on the primary side
 - f. The supply frequency is the frequency of the network
 - g. If **Link Channel 4** is ticked, the forth channel will be assumed to have the same measurement interface as channels 1 to 3.
 - h. Tick **Enable** under **Current Channels** to measure current related parameters
 - i. The **Input Type** selection selects which current inputs are used on the instrument.
 - j. A helper calculator is provided to calculate serial CTs.
 - k. The type of CT used is selected in the **CT** field. This selection affects harmonic magnitude and phase angle. If no CT is selected the instrument makes no correction for frequency effects.
 - l. The polarity of a current channel can be inverted by ticking the corresponding channel under **Invert Channel Polarity**.
- 5) Click **Create** to create the meter point

The meter point will now be listed in the meter point selection panel.

Note: Meter point creation occurs on the instrument. If communications fail during creation Osprey Lite will not insert the meter point into its database.

5.2 Editing a Meter Point

To edit a meter point the meter point must be online.

- 1) Select **Setup → Configuration : Meter Point**
- 2) Select the meter point in the meter point selection panel
- 3) Edit the meter point and click **Commit** (refer to Section 5.1 for detail)

5.3 Attaching and Detaching Meter Points

A meter may be detached from a meter point for example when the instrument is to be relocated. An already created meter point may also be re-attached if it was previously detached. To attach a meter point the instrument to which it must be attached must be online.

- 1) Select **Setup → Configuration : Meter Point**
- 2) Select the meter point in the meter point selection panel
- 3) If the meter is shown as offline, but currently attached to a different instrument than the instrument where it should be attached, first detach the meter point by clicking **Detach**
- 6) Click Attach and select the instrument and meter side where the meter point must be attached.
- 7) Click **OK**

The configuration, including which trends and monitors to record, will now be attached to the instrument and should show as online.

5.4 Trend Recording Configuration

Select **Setup → Configuration : Trends** to configure which trended data the instrument has to capture. The trend categories are:

- 1) Time Based Trends
- 2) 10/12 Cycle Block Trends
- 3) Synchrophasor trends
- 4) Ultra-High Resolution
- 5) Mains Signalling

Configuration - Bahnhof 50 V6

Meter Point Trends Monitors Other

Time Based Trends

☒ 10 Minute Interval ☒ Harmonics ☐ 25kHz Harmonics ☒ Min/Max ☐ On Cycle

☒ 1 Minute Interval ☐ Harmonics ☐ 25kHz Harmonics

☐ 10 Second Interval Frequency

☐ Billing ☐ Use emission method for harmonics

10/12 Cycle Block Trends (n x 200ms Interval)

☐ 15 Block Interval (± 3 seconds) ☐ Harmonics ☐ 25kHz Harmonics

☐ 1 - Block Interval (200 ms) ☐ Harmonics ☐ 25kHz Harmonics

Synchrophasor Trends

☐ 3000 - Cycle Interval

Ultra High Resolution Trends

☐ Continuous 1/2-Cycle RMS Recording

☐ Continuous Waveform Recording Voltage Wave Resolution 128 Current Wave Resolution 128

☐ Enable Current Recording Record channel 1 to 3

Mains Signalling

Frequencies (up to 8, comma separated)

Commit Revert Changes Save Template Select Template

Figure 4: Trend Configuration

Four **Time Based Trends** exist:

- 1) 10 minute
- 2) Variable time (to be specified by the user in minutes)

- 3) 10-second frequency
- 4) Billing

The data is aggregated according to time and start on an even time interval within the hour. Billing data is recorded every five minutes on the hour.

The aggregation period of **10/12 Cycle Block Trends** are determined in part by the network frequency. Each block contains either 10 cycles for 50 Hz networks or 12 cycles for 60 Hz networks. Thus, each block consists of 200ms of data. Two **10/12 Cycle Block Trends** exists:

- 1) 15 blocks
- 2) Variable number of blocks

Synchrophasor trends require specification of the rate at which the synchrophasors are trended. If the synchrophasor is followed cycle by cycle, a high resolution of 50 synchrophasors per second result (and per phase). The volume of data can be significant, but it can be reduced to up to one synchrophasor every minute.

Ultra-High Resolution trends record continuous cycle and wave data. The display of this type of data is not supported by Osprey Lite, but the data can be exported to text files from where it can be processed further.

Mains Signalling trends allow the recording of trended data for up to 8 signalling frequencies. The data for the frequencies can be viewed in order of frequency for each of the normal trended periods (e.g. **Mains Signalling 1** will be the first frequency). For all periods, except for the 10 minute trend, the values are the RMS value for the period. However, for the 10 minute trend, the reported value is the maximum value measured during the 10 minute period.

*Note: Configuration is not applied to the instrument until the **Commit** button was not clicked.*

5.4.1 Trend Filters

Time-based power quality trends contain a large set of parameters. Trends with small aggregation periods cause large amounts of data to be stored on the device, and accordingly require large and time-consuming data downloads.

If only some parameters are desired, PQ trends can be filtered by clicking on the filter button . Only the selected parameters will now be captured on the device. The filter only applies to RMS values. Harmonic parameters can be enabled or disabled independently. Note – harmonic parameters outweigh RMS parameters in terms of storage size and required download time by a ratio of 15 to 1. Accordingly, under normal circumstances filtering trends is only sensible when harmonic parameters are disabled.

5.5 Monitor Configuration

A monitor is an action on a meter that monitors the data stream for specific events. A monitor is used to set the trigger condition for the capture of diagnostic data during a waveform event.

Several monitors can be configured for the ImpedoDUO and Vecto II. To enable a monitor, select its check box under **Setup → Configuration : Monitors**. A dialog will open in which the detail of the specific type of monitor can be entered. Each dialog is divided into two parts, the condition on which the monitor will trigger the recording of an event, and the type of diagnostic data that will be captured during the event.

There are four monitor categories:

- 1) 1/6th-Cycle Interval
- 2) 10/12-Cycle block Interval
- 3) 10-Minute Interval

4) 50 kHz Interval

The monitors in each category monitor the data stream of its respective category. E.g. the Voltage Spike monitor looks for voltage spike events in the 50 kHz data signal, and the Voltage Regulation Exceedance monitor looks for voltage regulation events in 10 minute trended data.

*Note: Configuration is not applied to the instrument until the **Commit** button was not clicked.*

The screenshot shows a software window titled "Configuration - Mon54" with a tabbed interface. The "Monitors" tab is selected. The window is organized into sections based on time intervals, each with a list of monitors and a corresponding "..." button to configure them.

Interval	Monitor	Action
1/6th - Cycle Interval	☐ Three-Phase Voltage Dip/Swell	...
	☐ Three-Phase Voltage Dip/Swell (Alternative)	...
	☐ Three-Phase Voltage Interruption	...
	☐ Two Out Of Three-Phase Voltage Interruption	...
	☐ Single-Phase Voltage Dip/Swell	...
	☐ Single-Phase Voltage Dip/Swell (Alternative)	...
	☐ Significant Voltage Change	...
	☐ Significant Current Change	...
	☐ Current Exceedance	...
	☐ Level Detection (Voltage Channel 4)	...
10/12 - Cycle Block Interval	☐ Voltage Distortion (THD) Exceedance	...
	☐ Voltage Unbalance Exceedance	...
	☐ Mains Signalling	...
	☐ Over/Under Frequency	...
10 - Minute Interval	☐ Voltage Regulation Exceedance	...
	☐ Voltage Distortion (THD) Exceedance	...
	☐ Voltage Unbalance Exceedance	...
50 kHz - Interval	☐ Voltage Spike	...
	☐ Voltage Fast Transient	...
	☐ Digital IO	...

At the bottom of the window are four buttons: "Commit", "Revert Changes", "Save Template", and "Select Template".

Figure 5: Monitor Configuration

5.5.1 Selecting Diagnostic Data to Record During Events

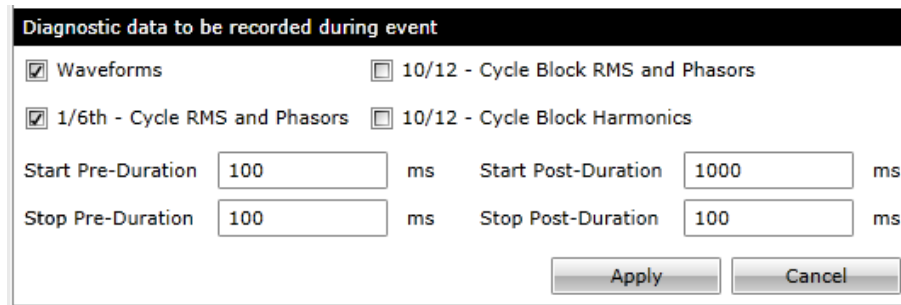


Figure 6: Diagnostic Data Options

Four types of diagnostic data can be recorded during an event (in addition to event statistics such as depth and duration) as shown in Figure 6:

- 1) Waveforms – the raw waveform data
- 2) 1/6th Cycle RMS data and Phasors – data aggregated for the duration of a cycle and recorded 6 times per cycle (giving 3 times the IEC 61000-4-30 ½-cycle resolution)
- 3) 10/12 Cycle RMS Block and Phasors – RMS data aggregated during a 10/12-cycle block
- 4) 10/12 Cycle block harmonics – harmonic data calculated for a 10/12-cycle block

The start pre- and post durations specify how much diagnostic data must be captured at the start of an event, whereas the stop pre- and post durations specify how much diagnostic data should be captured at the end of an event (see Figure 7). The pre-start duration can be set up to 30 sec.

In addition, most monitors allow the specification of a hold-off period from 0 to 3 min. Events with duration less than this period will not be captured.

Hysteresis can be set by the user to avoid for example when voltage is relatively low and near the dip threshold for example causing numerous dip events. Consecutive events within 30ms are also combined into one single event as per NRS048 requirement to cluster dips that are due to one event.

Note: the changes in configuration are only uploaded to the instrument when the “Commit” button is clicked.

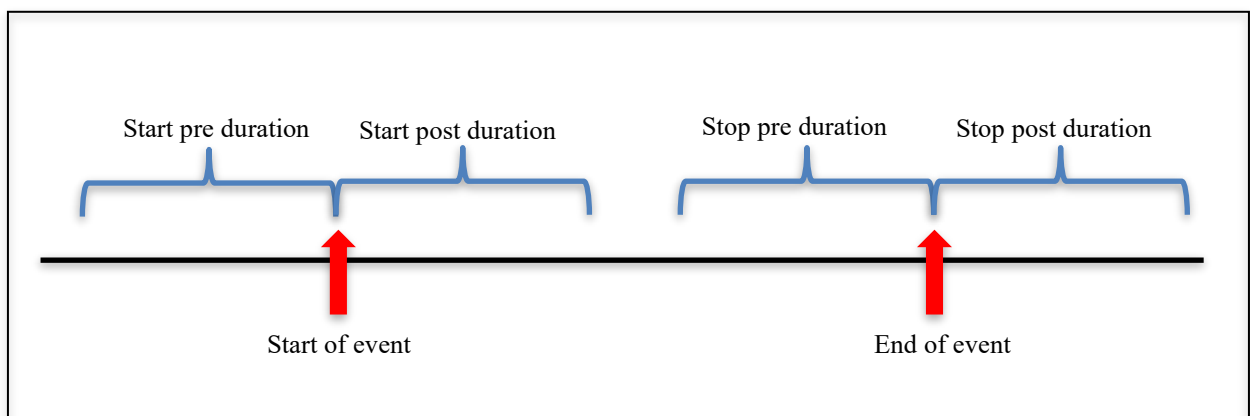


Figure 7: Definition of Start & Stop Pre/Post Duration

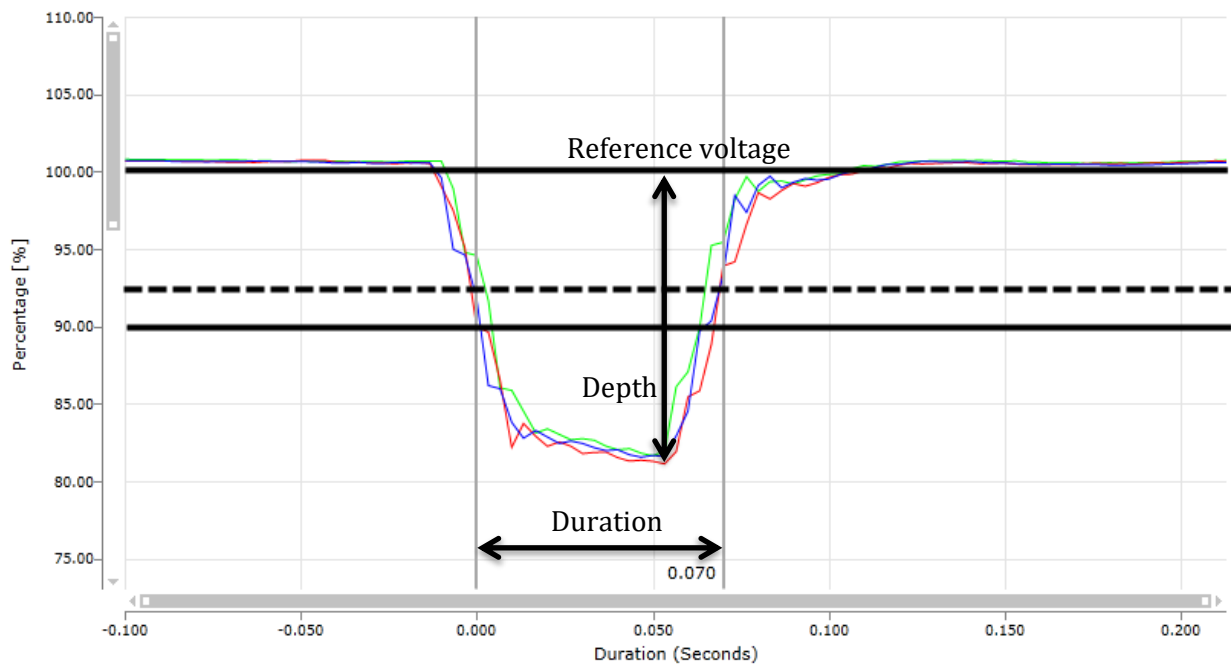


Figure 8: 1/6-Cycle Voltage RMS data during a dip with 2.5% hysteresis

5.5.2 Switching a Relay with a Monitor

The Impedo DUO has six digital outputs (or relays). The Vecto II has four. These instruments have the ability to close the relay when a monitor triggers. To set the relay which should be closed, select the relay number from the drop-down on the monitor that should control the relay. A value of **None** implies no relay is closed.

Relay 1 for the Vecto II and Relays 1 and 2 for the Impedo DUO are used to signal that the respective meter sides have configuration attached and are recording. Therefore, these relays are not available to be triggered by a monitor.

If the **Auto-Reset** checkbox is ticked, the relay will open after being closed by an event. If it is not ticked, the relay will stay closed until it is manually reset via a SCADA command, the instrument is restarted, or the recording service is restarted. When the instrument is powered down the relays are open. Relays will stay open after power-up, until closed by a monitor.

Relay Settings

Relay Number

2

☒ Auto-Reset

Figure 9: Monitor Relay Settings

5.5.3 1/6th-Cycle Monitors

These monitors use the 1/6th cycle RMS voltage to trigger the recording of a voltage waveform event. 1/6th Cycle Data is aggregated for the duration of a cycle and recorded 6 times per cycle.

5.5.3.1 Three-Phase Voltage Dip/Swell & Three-Phase Voltage Dip/Swell (Alternative)

To activate the **Three-Phase Voltage Dip/Swell** monitor tick it under **Setup → Configuration : Monitors**. The monitor configuration dialog will appear. The Upper and Lower limits are specified in percentage of declared voltage.

A voltage dip or swell is recorded according to the rules set by the IEC 61000-4-30 for a Class A PQ instrument. The monitor triggers when any phase exceeds the specified thresholds and completes when no phase exceeds the thresholds. Two parameters are retained during the recording of the voltage waveform event, namely depth and duration. A voltage swell event is recorded when the upper limit is exceeded, and a voltage dip when the lower limit is exceeded.

Two three-phase dip/swell monitors can be defined and operated simultaneously. The **Three-Phase Voltage Dip/Swell (Alternative)** monitor can be used to trigger under different circumstances (e.g. deeper dip) and capture different diagnostic data.

Figure 8 shows diagnostic data captured during a dip. The reference voltage is 100%, the dip threshold 90% and hysteresis 2.5%. The event started when the red phase fell below 90% and completed when then the red and blue phases rose above 92.5%. The event had a depth of 81% as this was the lowest value that any phase obtained during the event (in this case the red phase). The duration of the event was 70ms.

5.5.3.2 Three-Phase Voltage Interruption

This monitor functions exactly like **Three-Phase Voltage Dip/Swell** monitor, except that it only triggers when all three phases exceed the thresholds and completes when not all phases exceed the thresholds anymore.

5.5.3.3 Voltage Dip/Swell & Voltage Dip/Swell (Alternative)

This monitor allows each phase to be configured individually. When **Link Channel 1-3** is set, all channels are configured the same. Unselecting it allows different thresholds per phase.

The depth of the dip is measured as the lowest RMS voltage in a phase, which can be different per phase if **Link Channel 1 -3** was unselected, otherwise the depth of the dip will be the phase with the lowest RMS voltage during the dip event.

5.5.3.4 Significant Voltage Change

This monitor triggers when a significant voltage change (expressed as a percentage of the declared voltage) is detected within a short period of time. Figure 10 present a significant rising voltage change event with a trigger threshold of 2%. The blue line depicts the 1/6-cycle RMS voltage that triggered the start of the **Significant Voltage Change** event.

A 3-second delay (a time constant) is used to track the blue phase. In the example at hand, the start of the event was at 200 ms when the 1/6-cycle RMS voltage instantaneously (within 1/6 of a fundamental frequency cycle, i.e. 3.333 ms for a 50 Hz signal) changed to 110% of the nominal.

The event ends at 1810 ms, as the blue phase has recovered below the 2% threshold. After 3 seconds, the trigger thresholds of $\pm 2\%$ are again symmetrical around the steady state voltage, which is now at 110% of nominal.

Other event monitors could be triggered during the **Significant Voltage Change** event such as a voltage swell event when the 1/6-cycle voltage do increase beyond 110% (voltage swell event trigger set at 10% above nominal).

5.5.3.5 Significant Current Change

The **Significant Current Change** is similar to the **Significant Voltage Change** monitor, but based on current. The delay (time constant) in use for the **Significant Current Change** monitor is 30s, compared to 3s for the **Significant Voltage Change** monitor. The conditions are set in ampere.

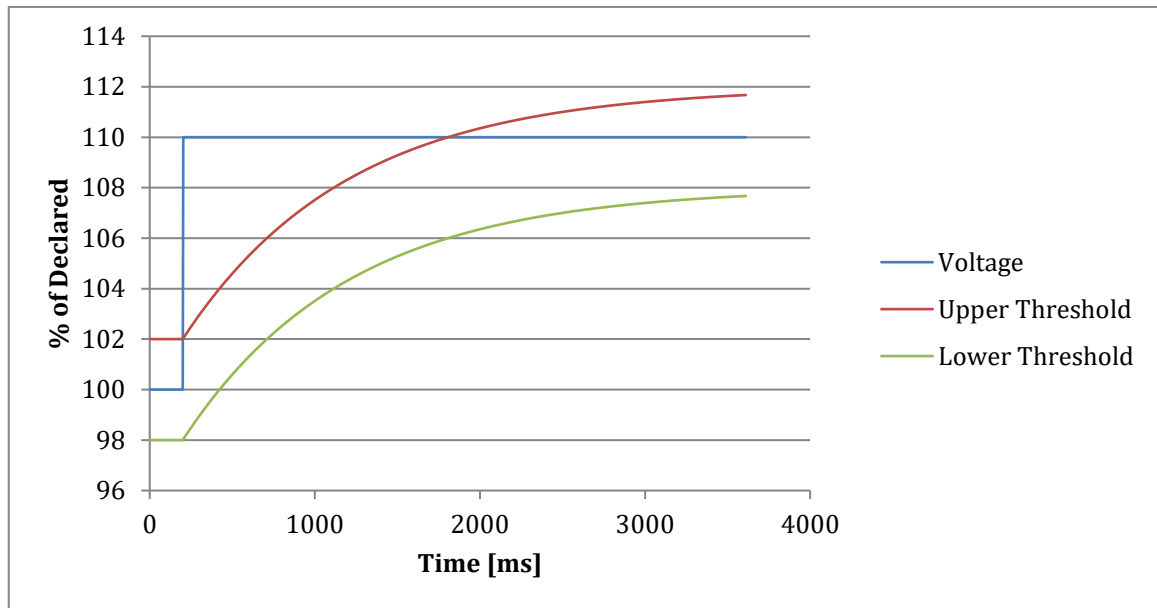


Figure 10 Significant Voltage Change

5.5.3.6 Current Exceedance

The upper and lower absolute current threshold is monitored. It triggers when the thresholds as set are exceeded.

Any limit applicable to investigation at hand can be set. For example, the start-up condition of a motor can be investigated by setting an upper limit in ampere, or any other load condition of which an increase/decrease in consumption is of interest.

5.5.3.7 Level Detection

The absolute value of the fully differential voltage channel 4 is monitored. The monitor can be configured to trigger when the threshold voltage is exceeded by setting selecting **Upper Limit**, or to trigger when the voltage level is not exceeded (i.e. below the threshold) by selecting **Lower Limit**.

5.5.4 10/12-Cycle Block Monitors

The **10/12-Cycle Block Monitors** track the following 10/12-cycle block parameters:

- 1) Voltage Waveform Distortion,
- 2) Voltage Unbalance,
- 3) Mains Signalling,
- 4) Over/Under Frequency

The Mains Signalling monitor can be used to detect power line communication. It monitors inter-harmonic components around the specified (inter-harmonic) frequency and triggers when a threshold set by the user is exceeded,

The settings in the pop-up blocks are similar to the settings for the 1/6-cycle monitors with a trigger set at a threshold level of interest for the parameter pertaining.

5.5.5 10-Minute Interval Monitors

The **10-Minute Interval Monitors** track 10-minute trended parameters:

- 1) Voltage regulation
- 2) Voltage waveform distortion,
- 3) Voltage unbalance.

The monitors function similarly to the Voltage Dip/Swell monitor.

Note: It will only trigger if the 10-minute trend was enabled.

5.5.6 50 kHz-Interval

The **50 kHz-Interval** monitors track the voltage waveforms to record a voltage spike and/or a voltage transient condition as defined below.

5.5.6.1 Voltage Spike

The **Voltage Spike** monitor is triggered when the instantaneous voltage exceeds an absolute threshold. It is used to observe adverse conditions of high voltage, which can possibly be a concern to insulation strength of equipment. The threshold is set by the user.

The number of times that the threshold was exceeded per 10/12-cycle block is counted and reported. Figure 11 shows a phase voltage with spike monitor thresholds. The monitor will capture two spikes for the block in which the event has occurred.

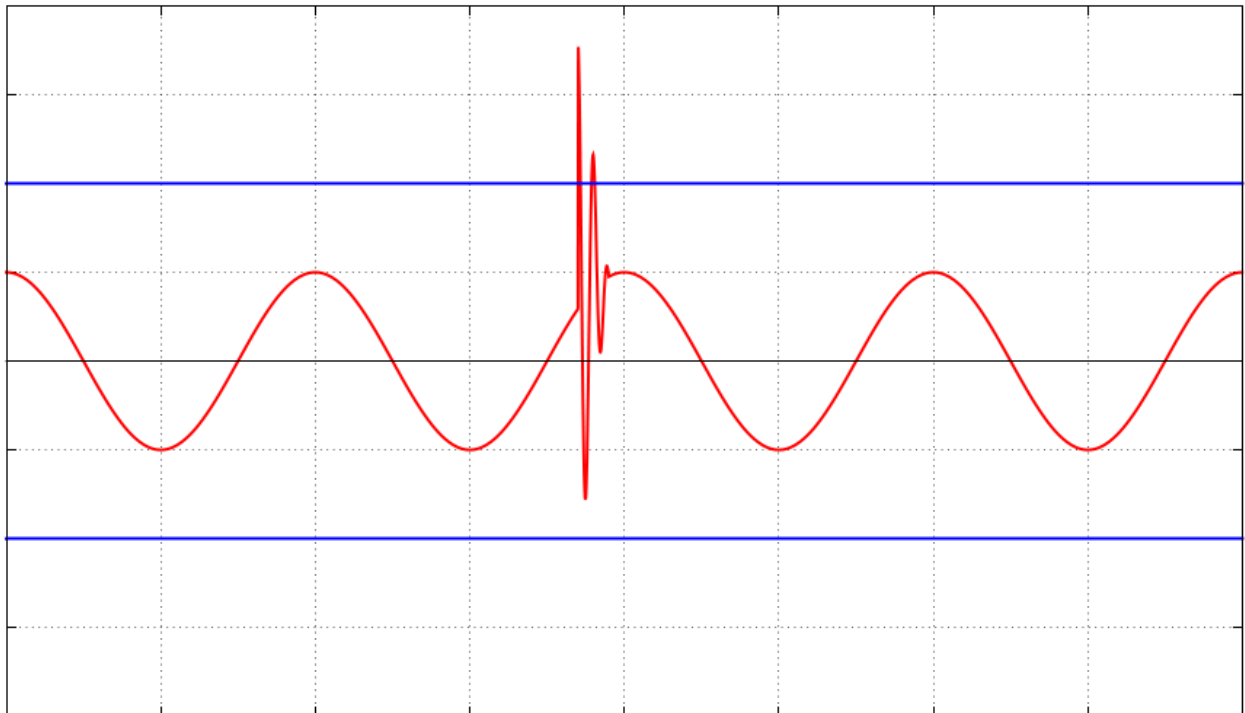


Figure 11: Voltage spike

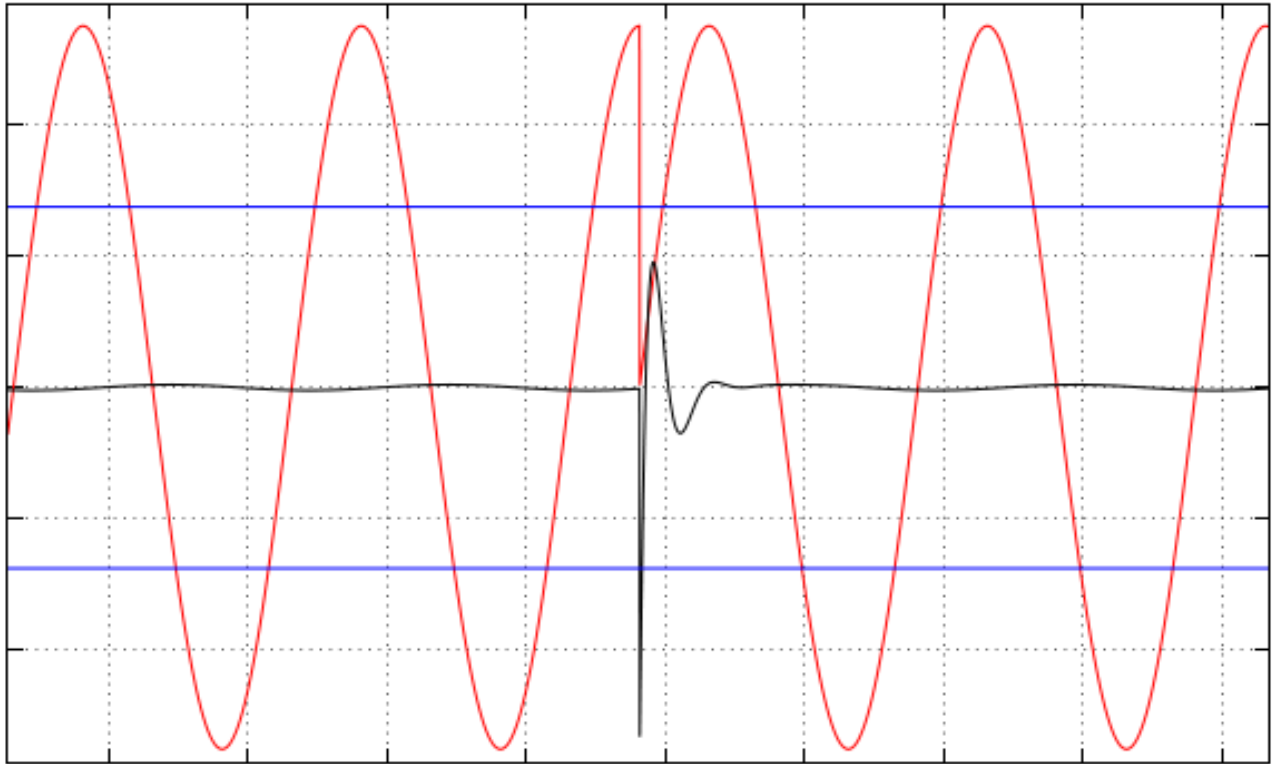


Figure 12: Voltage Fast Transient

5.5.6.2 Voltage Fast Transient

The **Voltage Fast Transient** monitor triggers on instantaneous changes in the voltage waveform. A high-pass filter with a cut-off frequency of 500 Hz is used to extract only higher (higher than fundamental) frequency information.

An event is triggered if a specified threshold level is exceeded. Figure 12 presents a phase voltage with a fast transient event. The red line is the digitised voltage waveform with the black line the output of the 500 Hz high-pass digital filter.

The blue lines depict the upper and lower thresholds. The filter isolates transient condition and the **Voltage Fast Transient** monitor will be triggered when the black line exceeds the value at which the lower blue line is set.

5.5.6.3 Digital IO

This monitor is only available on the Vecto II. It monitors the 4 digital input channels and triggers whenever a state change occurs on any channel.

5.6 Selecting Waveform Down-Sampling Rate

The ImpedoDUO and Vecto II can store captured waveform data up to 50000 samples per second (50 kHz). The instrument can be configured to store subsampled data, thereby lowering the resolution of the diagnostic data returned, but also reducing the size used by the diagnostic data on the instrument and subsequently in Osprey Lite. The subsample rate can be set (for an online instrument) using **Setup → Configuration : Other**. The subsample rate applies to the entire instrument and all monitors. The new rate is only applied after clicking on **Commit**.

6 Configuration Templates

Meter configurations can be saved as templates using the Save Template button on **Setup → Configuration**. A template configuration can then be applied again to another meter point using Select Template.

Templates can be managed from **Setup → Manage Templates**. From this screen templates can be edited, deleted, and uploaded to an instrument. After a template was uploaded to an ImpedoDUO the template will be available from the ImpedoDUO's meter configuration application. Templates can also be exported to a file. The template can then be imported by another installation of Osprey Lite, allowing template sharing.

7 Viewing a Real-Time Snapshot

Once a meter is attached to a meter point it is possible to obtain a snapshot of data currently being measured. Observe that a real-time view in the true meaning of “real-time” is not possible due to the high sampling rate of the instrument resulting in bandwidth constraints. It is rather a snapshot that has to be manually refreshed by the user.

Select **Communication** → **Real-Time View** from the functionality menu. Select the meter point of interest and click on **Read Block**. Three sub-views are available for the snapshot:

- 1) Voltage and current waveforms as 2 separate graphs,
- 2) Voltage and current waveforms combined onto one graph,
- 3) Views of the harmonic spectrum.

Osprey Lite also allows the continuous requesting of real-time snapshots. To enter this mode, click **Continuous Read**. Osprey Lite will not keep requesting real-time snapshots until **Continuous Read** is clicked again. The data is not saved to Osprey Lite’s database is available only for display purposes. Note that each request comprises a fair amount of data. Thus, use of this function over long periods of time over expensive communications infrastructure is not advised.

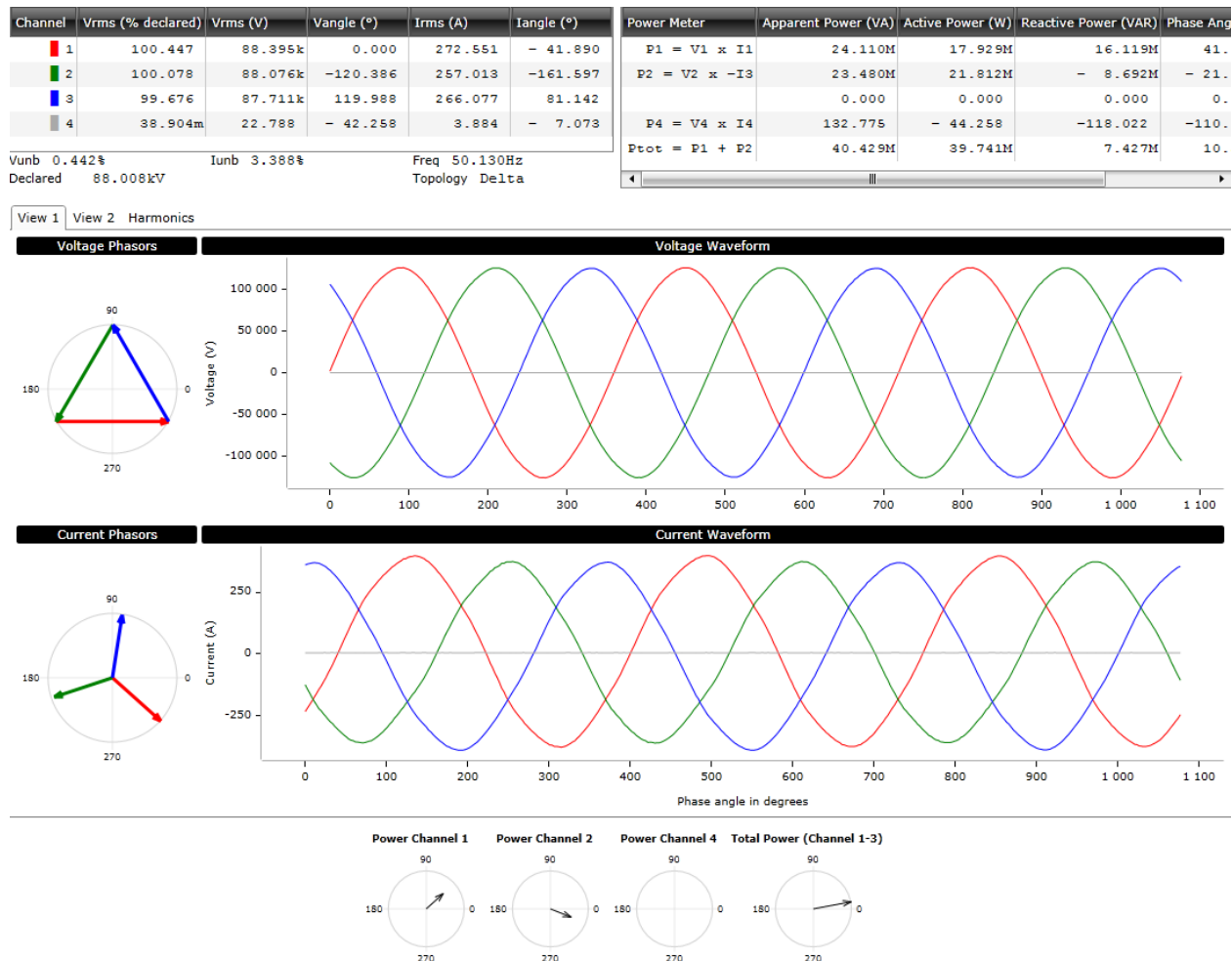


Figure 13: Example Real-Time View Display

8 Tasks

Many Osprey Lite user-initiated functionality happen fast or requires that the user wait for the action to complete. Some functions may take a significant period of time where it would be a hindrance for the user to wait for the function to complete, e.g. data download, data import/export, and data deletion. This type of functionality is handled as Osprey Lite tasks. The current list of scheduled and executing tasks is listed under **Other → Tasks**. This view also provides the user with progress information about tasks, and the possibility to cancel a task.

9 Downloading Data

Data can be downloaded with the **Download Data** function. Select the instrument to download data from and connect to it, if it is not online. Data cannot be downloaded while the instrument is offline. Downloads in progress will show in the **Other → Tasks** view.

9.1 Data Selection

9.1.1 New Data

The user has the option to download all new data, or only a specific type and period of data. To download all data not yet downloaded from the instrument, select the option **New Data**. The data is downloaded by a background task and the user can continue using Osprey Lite while the download is in progress. To view the list of download tasks in progress, open the **Other → Tasks** function. Please note that the ImpedoDUO does not support multiple simultaneous downloads (i.e. from multiple instances of Osprey Lite at the same time). Neither do Vectographs and Provographs.

9.1.2 Targeted Data

If a specific set of data is desired, select the **Targeted** radio button and select the meter point (on this instrument) for which data should be downloaded. Observe that more than one meter point can be associated with one ImpedoDUO. Two metering points can be wired to a single instrument simultaneously, but the instrument could also have been used at different metering points earlier.

Next, select the range of the data to retrieve and select **Download**. If the data already exists in the Osprey Lite database it will not be overwritten. Only data not yet in the Osprey Lite database will be inserted. Targeted data will also not be handled as “new” data. Downloading new data will commence from where the last new data download ended.

9.2 Data Types

The user may opt to download all data or only certain types of data. All selected data types will be requested at each data retrieval transaction according to the type record size, or number of rows for the specific type. By default the download chunk size is automatically determined according to the available bandwidth.

9.3 Options

9.3.1 Override Download Size

The user may opt to override the automatically determined download chunk sizes. The more data is downloaded per chunk, the longer chunk retrieval time. Note that on very slow connections, an overly large chunk size may cause a transfer timeout. However, each data chunk retrieval has overhead associated with it, and larger chunks may minimize this overhead.

9.3.2 10 Minute Trends Only

The ImpedoDUO and Vecto II can capture trends with small aggregation periods resulting in large volumes of data. The user may opt to only download trends with a 10 minute period. Note, after the download the high water mark, or location where the next download will start, will be after the last 10 minute trend. To download earlier trends with non-10 minute periods either a targeted download must be performed, or the user must move the high water mark back (see Section 9.3.4).

9.3.3 Downloading RMS or Harmonic Data Only

The user can select to download both RMS and harmonic data where applicable, or download only RMS or only harmonic data. Harmonic data represents the bulk of the data with a data size ratio of approximately 20 to 1 if all harmonics are enabled (See Section 9.5).

9.3.4 Setting the High Water Mark (Download Location)

The user can select change the point in time from when new data will be downloaded for the ImpedoDUO and Vecto II. Select the desired date under **Communication → Download Data : New Data Download From**. Click Apply on Instrument and wait for confirmation of success. New data will now be downloaded starting from the selected point in time.

9.3.5 Disable Block Download Delay

Diagnostic event data (blocks) captured during an event is normally delayed by 60s before it can be downloaded. This delay allows XTriggers from other instruments to capture more diagnostic data. Ticking the checkbox **Communication → Download Data : Disable Block Download Delay** disables the delay, possibly resulting in some diagnostic data not being downloaded. The data can be downloaded at a later time using a targeted download (see Section 9.1.2) or setting the high water mark to a time prior to the event (see Section 9.3.4).

9.4 Advanced

The user may opt to download the encoded data chunk on the ImpedoDUO / Vecto II. The data is downloaded to a folder specified with the setting **Bruteforce Download Folder** in the **Setup → Preferences**. This download method is intended to be used when a large amount of data needs to be downloaded rapidly but not imported into Osprey Lite. When the download completed the data chunk can be imported using the **Manage Data → Import** (see Section 12). Note that during this download data recorded on the instrument is inserted into a memory buffer and only persisted to permanent storage once the download completed. Thus the possibility of some data loss exists (e.g. if the instrument is turned off during the download). To increase speed, communication for this data transfer method is also not encrypted.

9.5 Meter Point Harmonic Download Mask(s)

The ImpedoDUO and Vecto II calculate 64 harmonic and 64 inter-harmonic components for a large range of parameters. The volume of data due to these harmonic components is significant. Osprey Lite allows the user to restrict the volume of data transferred and maintained in Osprey Lite's database by downloading only selected harmonic components for a given meter point. This selection is referred to as the harmonic download mask.

The harmonic download mask for currently attached meter point(s) is shown graphically on the download screen. Solid green rectangles indicate that the harmonic component is enabled. To change the download mask, click **Change Mask**. This will navigate the user to **Setup → Harmonic Download Mask**. This function also allows the configuration of the harmonic download mask for any known meter point.

For Vectographs all harmonics configured on an instrument are downloaded. Provographs do not measure harmonics.

9.6 Continuous Data Download

Osprey Lite can be configured to download data continuously. It will download all new data every 10 minutes (or user configured period), and events for the ImpedoDUO and VECTO as they occur. To enable continuous downloads tick **Continuous Data Download** under **Setup → Preferences** and then click **Apply**. Thereafter the Osprey Lite service needs to be stopped and started again.

10 Timed Recording

A timed recording is a user-initiated event that is created on an ImpedoDUO for a specific duration during which diagnostic data can be recorded as for any other event. The result of a timed recording can be viewed on the event viewer like any other event. A timed recording can be scheduled as follows:

- 1) Click on **Communication → Timed Recording**
- 2) Specify the recording schedule
- 3) Choose the diagnostic data to be recorded
- 4) Click **Commit**

The VectoGraph does not support this functionality but the ProvoGraph does where the latter support up to 60 seconds of recording time. Once a timed recording has started for a ProvoGraph, the progress can be monitored on the Tasks screen and stopped prematurely should the user decide to do so. Following the timed recording, a download will immediately be initiated for the ProvoGraph as it has limited on-board storage capacity.

11 Instrument Management

Communication → Manage Instrument provides various management functions mainly aimed at the ImpedoDUO and Vecto II. Unless otherwise stated, the sections below refer only to these two instruments.

11.1 Settings

11.1.1 Registration

This function is used to register an instrument for a given purpose.

Enterprise:	Register as part of an enterprise fleet. The instrument will attempt to log into the specified fleet server automatically. The fleet password is discussed in Section 4.1.
Standalone:	Register as a standalone device that will not automatically log into a central server. The fleet password is discussed in Section 4.1.
Account:	Register as an Osprey Pro device

Registration can also be configured via USB as follows:

- 1) Format a USB stick with the FAT32 file system
- 2) Create a directory in the root folder of the device called `OspreyPro`
- 3) Copy the instrument key into the folder – its name must be `[serial].key`, e.g. `Mon000000001.key`
- 4) In the folder, create a file called **type** with its contents one of the following: `StandAlone / Enterprise / Account`
- 5) If a password has to be set, create a file called **password** with its contents the required password
- 6) For enterprise and account registration, create a file called **server** with the address of the server to connect to
- 7) For account registration, create a file called **accountcode** with the provided of the account code for OspreyPro.
- 8) Insert the USB stick into the device
- 9) The change should be complete within 60 seconds

11.1.2 Ethernet Settings

This dialog is used to configure the IP address of an instrument remotely. See Section 0 for more detail.

11.1.3 Miscellaneous

Space Reclaimer deletes old data when the internal storage on the instrument becomes full. It can be configured to delete data (oldest first) when reaching a specified percentage of storage usage, or when the remaining space available reaches a set size. If both the percentage usage and minimum free space is set, the limit that is reached first will apply. If the maximum percentage usage is set to 100 and the minimum free space is set to zero and the storage usage reaches 100% the system will detach the meter points and stop recording. The period between storage checks is configurable.

The instrument will not record any PQ data unless it has valid time. Time-Master manages this aspect of the instrument. It automatically determines the best time source. It will use the following sources in order of preference: GPS, Network time, internal clock. Automatic time source selection can be disabled by setting the time source explicitly to either GPS or NTP. This is recommended when it is known that the time source will be permanently either GPS or NTP, as it

will prevent the system from switching between the two sources which may cause small time jumps.

Time-Master will query pool.ntp.org to find the best NTP server close to the instrument. If a specific NTP server is desired, the server IP address or DNS name can be entered in the Network Time Custom Server field.

The password used for Modbus authentication can be set from this menu. See *CT LAB Impedo DUO and Vecto II SCADA Interface Manual* for more detail.

The threshold from which logs will be written on the instrument can also be changed.

11.1.4 Service

This dialog is used to enable/disable various services on the instrument:

- Recording service
- Modbus
- DNP3 (Optional module)
- FTP Export (Optional module)
- IEC 61850 (Optional module)

Please see the instrument specific user manuals for more detail.

11.1.5 Sync Instrument Time

Sync Instrument Time can be used to synchronise the time of the instrument with the time of Osprey Light. If the instrument already determined that it has valid time it will not accept the time received from Osprey Lite, unless the **Override Valid Time** is ticked.

Sync Instrument Time can also be used to synchronise time on Vectographs and Provographs. Note that these instruments can have their times automatically synchronised on download by enabling the **Synchronize Legacy Instrument Clock on Download** option on the **Setup → Preferences** screen.

11.1.6 Set DNP3 Class Assignment Override

This function is used to change the DNP3 class assignments. Please refer to *CT LAB Impedo DUO and Vecto II SCADA Interface Manual* for more detail.

11.2 Control

11.2.1 Restart Recording Service

Restart the recording service on the instrument. It is important to note that *restarting the recording service may result in data loss and should only be done for diagnostic or troubleshooting purposes*.

11.2.2 Restart Meter Gateway Service

This will restart the instrument management service. This function should only be performed for diagnostic or troubleshooting purposes.

11.2.3 Restart Instrument

This will restart/reboot the instrument.

11.2.4 Reset Instrument

This will reset the instrument to factory default settings. All data, all meter points and configuration, as well as instrument settings (e.g. time source, registration settings, fleet password, etc.) will be reset to their default values. The IP address settings of the device will not be affected however.

11.3 Diagnostics

11.3.1 Request Instrument Status

This will request status information from the instrument:

PC Time Instrument Time	Current Osprey Lite and instrument time, respectively
Time Is Valid	True if the instrument's time is considered valid
Time Source	Indicates the source of time on the instrument
Meter Point A/B Attached	True if a meter point is attached to the respective side
Recording Subsystem Running	True if the recorder subsystem is running
Database is OK ³	True if the instrument's data storage is in tact
Time Is Valid	True if the instrument's time is considered valid
Drive Usage	The percentage of storage used
Battery Remaining Capacity ⁴	The percentage of battery remaining
Battery is Charging	True if the battery is charging
System Temperature	The temperature of the instrument
IP Address	The IP address of the non-DHCP port
Firmware	The firmware revision of the instrument

11.4 Advanced

11.4.1 Enable Secure Shell

This setting enables the secure shell on the device and is used only during expert intervention.

11.4.2 Enable Telnet

This setting enables the insecure telnet service on the device and is used only during expert intervention. The instrument need not be online for this function to be available (the IP address of the instrument may not be blank, however).

11.4.3 Edit Environment Variables

This is a low level function to edit settings on the instrument. *Note: invalid use of this function may cause undefined behaviour or damage the instrument.*

³ If this is false a serious fault occurred on the instrument. The only recourse is either to contact CT LAB support or to reset the instrument (deleting all data, meter points, configurations and settings)

⁴ The instrument will shut down automatically if it is not charging and this percentage reach 50

12 Importing/Exporting Data

Data can be exported from Osprey Lite as CSV, XML (for import by MS EXCEL), PQDIF, EPQDIF (Eskom format) or DB Transfer data under **Manage Data → Export**. CSV and XML files can be viewed in a Microsoft Excel or a text viewer. PQDIF files can be viewed with third party tools. DB Transfer files are binary files that can be imported into another instance of Osprey Lite. When exporting data as DB Transfer, the user may opt to include the meter keys. When this option is selected the transfer file will contain all the meters and their keys. If it is not selected the transfer file will contain only the meter metadata, but not the meter keys.

To import data, select **Manage Data → Import**. If the data is a DB Transfer file, select **From File** and specify the file location. Alternatively, data can be imported from another Osprey Lite installation by choosing the **From Host** option and specifying the IP address of the host to connect to. In the latter case, all data will be imported the first time after which only new data will be imported from that specific host.

Import/Export sessions in progress will be displayed in the **Other → Tasks** view. The import/export is only complete once the task is removed from the view. Exported files may have a zero file size until the export is complete.

13 Deleting Data

Osprey Lite allows the user to delete data from connected instruments or from Osprey Lite's own database. To delete data from the instrument select **Communication → Delete Meter Data**. The user can either select a meter point from the list of online meter points, or select an instrument from the list of online instruments. For a meter point several delete options are available. When the user selects a meter, the user can delete either all meter points on the instrument, all data from all meter points on the instrument, or delete a specific meter point from the instrument. Note that the delete functionality only kicks off the deletion process on the instrument. The progress of the deletion may be inspected by downloading the log events from the instrument and inspecting them with the function **View Data → System Log**.

To delete data from Osprey Lite's database, select **Manage Data → Delete Osprey Data**. The user will again be presented with a list of delete options. The delete action is executed as a task which will be listed in the task lists that is visible at **Other → Tasks**. Any errors will be logged to the system log.

14 Merging Meter Points

Data from one meter point can be merged into another meter point on the **Manage Data → Merge** screen. The meter point to keep can be any meter point whether attached or not. The meter point to merge may not be attached to any instrument. If the two meter points correspond to the same instrument and at least one is attached, the instrument must be online. If the instrument is online and both meter points correspond to the instrument, the meter points will be merged locally on the instrument as well.

15 Viewing Trended Data

15.1 Trend Viewer Layout

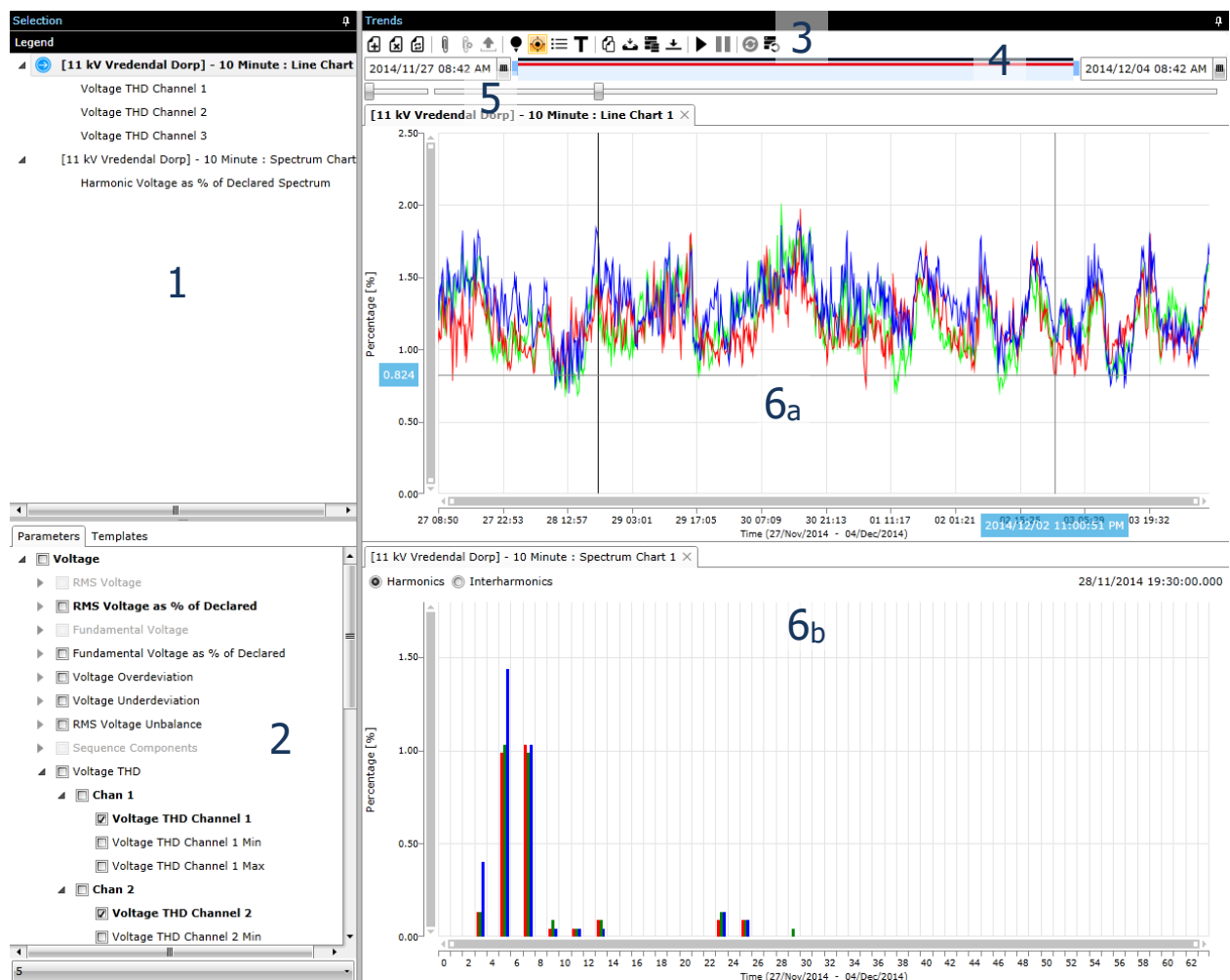


Figure 14: Trend Viewer

The trend viewer is found under **View Data** → **Trends** and is shown in Figure 14. It consists of the following areas:

- 1) Legend – Lists the charts (names and values series) that have been created and indicates the selected char using a blue circular icon with a white arrow in its centre.
- 2) Parameters and Templates Tabs – Lists the available parameters that can be placed on charts. Charts and parameters already created can be saved as templates and these templates can be selected from here.
- 3) Toolbar
- 4) Date Range Selector with Data Availability Display – Select the start and end of the period for which data availability should be shown. Two sliders on the left and right on the bar can be dragged to select the period for which data will be queried.
The bar contains different horizontal lines indicating availability of different fixed period types of trends (10-minute and 15-block RMS data and 10-second frequency data). The availability bars are colour coded as in Table 1. The availability bar does not show availability of trended data for other aggregation periods (for a complete data availability view, select the **Available Data** function in the navigation menu **Other**).
- 5) Playback Sliders – Sliders control playback speed and time for spectrum charts
- 6) Chart Area – Charts that were added are shown here, where 6_a is a line chart and 6_b is a spectrum chart

15.2 Graphing Data



Figure 15: Trend Viewer Toolbar

Black (top)	Ten minute trends
Red (middle)	Three second trends
Green (bottom)	Ten second frequency data

Table 1: Date Range Data Availability Colour Codes

The toolbar (see Figure 15) has the following functions

- Add chart for the currently selected meter point and date range
- Remove selected chart
- Reload data for all charts
- Save current charts configuration as a charting template
- Delete the selected charting template in the Templates tab
- Apply a chart template to the currently selected meter point and data range
- Toggle graph markers on/off (markers show the data with full accuracy)
- Toggle graph crosshair on/off (values are displayed up to 3rd decimal)
- Toggle graph legends on/off
- Toggle graph titles on/off
- Copy selected chart's image to clipboard
- Save selected chart's image to PNG file
- Copy selected chart's data to clipboard in CSV format
- Save selected chart's data to CSV file
- Play through the selected data range on spectrum charts
- Pause playing through the selected data range on spectrum charts
- Find the last available 10 min trended data and adapt the date ranges accordingly
- Reload the data availability display for the current date ranges
- Real-time updated trend view

To graph a specific data set:

- Select the meter point of interest (all further actions will be apply to the selected meter point)
- Select the date range for which the data must be displayed using the date range selector
- Add a new chart using the **Add Chart** toolbar button (a)
- A dialog will request the following information:
 - Chart Type - Line (for plotting a specific parameter(s) over time) or Spectrum (to view all available harmonics for a specific parameter).
 - Chart Period – 10 minute, 3 second or Variable (Minute or Block trends can be chosen for the latter)
- Select which parameters should be graphed in the **Parameters** part of the selection panel.

The selected parameters will be shown in under the current chart in the **Legend** area, including actual, per unit and percentage of nominal values. Relevant parameter units will be used to label axes. To remove a specific graph, select the corresponding parameter in the legend and then click on the **Remove** toolbar button (b). Likewise an entire chart can be removed by selecting the chart in the legend and clicking the **Remove** toolbar button (b).

To zoom in the chart use the mouse scroll wheel – the chart will zoom around the mouse pointer. The data resolution and axes labelling will increase with the level of zoom. Alternatively, click inside either the horizontal or vertical axis and drag the selection to view only the selected data. To pan to the left or right, right-click the graph and drag it to the left or right. Double left-click will auto centre the graph and zoom to fit the available data.

If harmonic data was captured it can be viewed on a line chart by selecting the relevant parameter under harmonics in the parameter selection panel. Select the desired harmonic either next to the channel to be added or at the bottom of the panel, and then add the parameter.

Note that two parameters can be graphed on the same chart only if they are of the same engineering unit. E.g. RMS voltage and Fundamental Voltage can be graphed together, but RMS Voltage and RMS Current cannot. Different engineering units can be graphed on top of each other with a synchronised x-axes by adding more charts (use toolbar button a as shown in Figure 15).

Also note that all timestamps are given in the time zone of the computer running Osprey Lite.

15.3 Graph Colours

Graph colours and line types are chosen automatically in the following way:

- The first time a channel of a specific parameter (e.g. V_{RMS}) is used, the channels of the parameter is assigned a palette of colours (red, green, blue, black for channels 1,2,3, and 4, respectively)
- When plotting other channels of this parameter the respective colours is selected from the assigned colour palette
- If channels from another parameter (e.g. V_{Fund}) is added to the same graph, the new parameter is assigned a new pallet (say light red, light green, light blue, grey for channels 1,2,3, and 4, respectively)
- All channels are drawn using solid lines, except min/max channels which are drawn using striped lines.

15.4 Viewing Real-time Updated Trend Data

In this mode Osprey Lite refreshes the graphed data and shifts the graphing periodically. This allows the display trended data as they are downloaded together with the history for the trend. The default period for data download and update is 10 minutes.

To configure the trended view to show data for periods other than the default 10 min data, the following steps are required:

- 1) Choose the aggregation period
- 2) Configure a trend of this period on the desired meter point
- 3) Navigate to **Setup → Preferences Setup** and set the **Continuous Data Download Requesting Interval** to the aggregation period
- 4) Navigate to **View Data → Trends**
- 5) Add the parameters to be viewed (be sure to plot the most recent data, as the displayed view will be updated as is)
- 6) Activate the Trend Viewer Real-time Mode using toolbar button (s).

Osprey Lite with now enter Real-Time Trend View mode. In this mode Osprey Lite disables other control functionality. To leave the mode, click toolbar button (s) again.

16 Viewing Events

To view events click on **View Data → Events** in the navigation menu. All timestamps are given in the time zone of the computer running Osprey Lite.

Click on **Search** to select the meter point and date range for which to view events. The user may also select which criteria to be used in the classification of events.

The list of available events will be shown with some information about the event, such as the type, start time and duration. In addition, if diagnostic data was captured, spark lines provide a quick view of the 1/6th cycle data captured during the event. The events are also shown in a time line at the top of the view.

When selecting individual events, a preview window will graphically present a preview of selected parameters. It will also graphically display classified data like NRS048 Scatterplots shown in Figure 17.

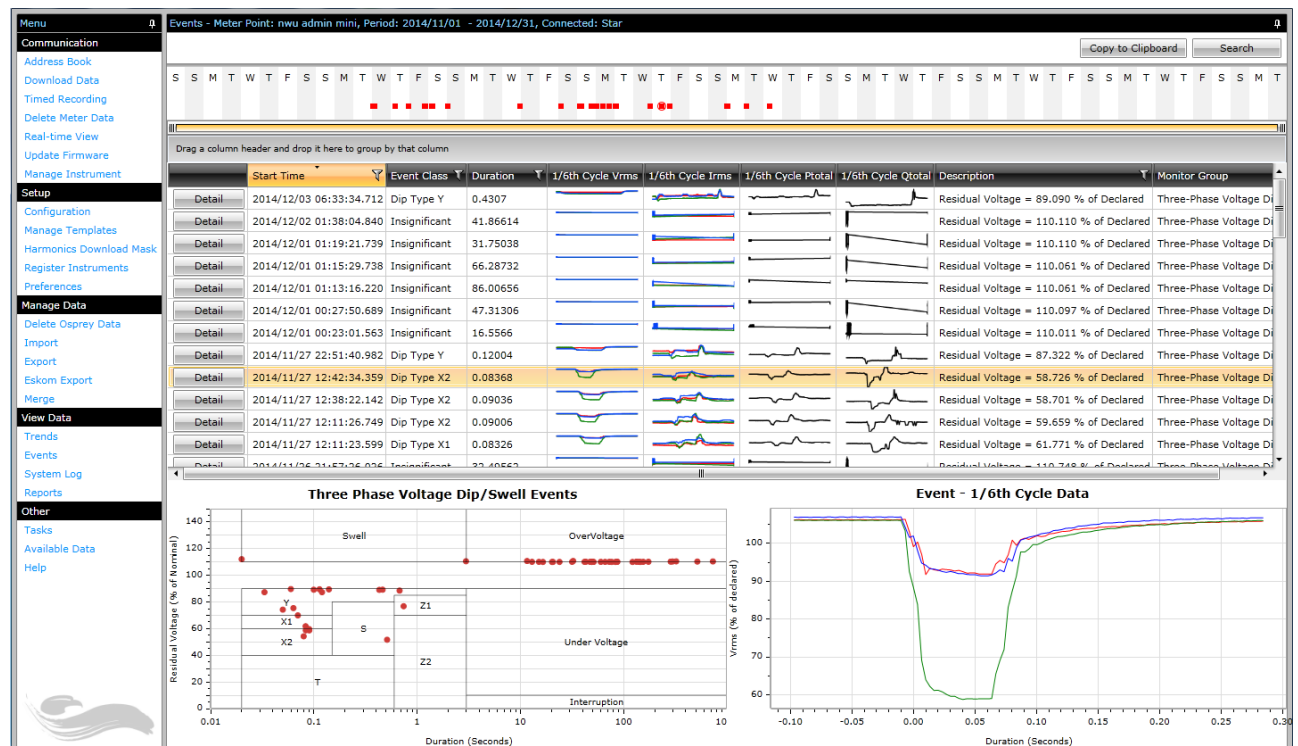


Figure 16: NRS048 data classification scatter plot and 1/6th cycle voltage profile

The **Copy to Clipboard** button copies the contents of the grid to the clipboard.

To chart the diagnostic data captured during the event, click on the **Detail** button of an event. This will bring up a graph viewer similar to that of the trend viewer in which the detail data can be graphed. Refer to Section 15 for details on the graph viewer.

17 Reports

Various reports can be generated per meter point on the **View Data → Reports** screen. All timestamps are given in the time zone of the computer running Osprey Lite. Selecting a different time zone will change the report where the demarcation of days, day of the week, or the month of the year is used. For example, a seven day sliding assessment report for 1 to 31 March in South African Standard Time may differ from a report for the same dates if the PC time zone is changed to GMT.

Reports for the following standards are available:

- 1) NRS 048-2:2007
- 2) EN 50160:2010

The following reports are available:

- 1) Site Assessment
- 2) Voltage Magnitude
- 3) Voltage THD
- 4) Voltage Unbalance
- 5) Voltage Harmonics
- 6) Voltage Flicker
- 7) Voltage Events

Reports can be generated in PDF or DOCX format. It is a known issue that the DOCX format does not display well in all word processing software and environments when the graph image format is vector graphics instead of bitmaps. Vector graphics scale and print better in environments where it is supported while bitmap graphics is wider supported. The type of graphics to use is configured under **Setup → Preferences : Export DOCX report graphs as images**.

18 System Log

View Data → System Log is used to obtain insight into what is happening in Osprey Lite or an instrument, e.g. to show the download history. To view the log, select the date range required and click **Load Events**. Logs from instruments are shown in boldface and logs from Osprey Lite in normal face. Row background colours are determined by the Log Level severity as follows:

- 1) Warning - Tan
- 2) Error and Fatal - Salmon
- 3) Debug and Info – White

System Log Events		
Date Logged	Log Level	Log Message
5/13/2015 6:00:01 PM	Info	Task '[Downloading data for Mon000000003]' started.
5/13/2015 6:00:01 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:02:22 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:02:22 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:02:23 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:02:23 PM	Info	Task '[Downloading data for Mon000000003]' completed.
5/13/2015 6:10:01 PM	Info	Task '[Downloading data for Mon000000003]' started.
5/13/2015 6:10:01 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:11:55 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:11:55 PM	Info	Task '[Downloading data for Mon000000003]' completed.
5/13/2015 6:19:10 PM	Info	Task '[Downloading data for Mon000000003]' started.
5/13/2015 6:19:10 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:21:01 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:21:01 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:21:02 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:21:02 PM	Info	Task '[Downloading data for Mon000000003]' completed.
5/13/2015 6:30:01 PM	Info	Task '[Downloading data for Mon000000003]' started.
5/13/2015 6:30:01 PM	Info	Started handling instrument:Mon000000003
5/13/2015 6:32:15 PM	Info	Completed handling meter Mon000000003.
5/13/2015 6:32:15 PM	Info	Task '[Downloading data for Mon000000003]' completed.
5/13/2015 6:40:00 PM	Info	Task '[Downloading data for Mon000000003]' started.

Figure 17: Log Viewer Showing Tasks Starting and Completing

19 Help

The help screen at **Other** → **Help** provides the following functionality

- release notes for the installed version of Osprey Lite
- software build number
- database version currently in use
- link to CT LAB's website
- functionality to report bugs in the software
- this manual
- manuals for the ImpedoDUO and Vecto II
- functionality to check for updated versions of Osprey Lite

20 Advanced Operations

20.1 Restarting Internal Services

20.1.1 Restarting Storer

Storer is the PQ recording subsystem on the ImpedoDUO and Vecto II. Under certain conditions it may become necessary to restart it manually via Osprey Lite. To restart the Storer service:

- 1) Open **Communication** → **Manage Instrument**
- 2) Select the target instrument
- 3) Verify that the correct serial number is shown
- 4) Select **Restart Storer Service** under the **Control** section
- 5) Click **Execute**

20.1.2 Restarting Meter Gateway

Meter Gateway serves as the main control subsystem of the ImpedoDUO and Vecto II. It handles all external communication. As such, when Meter Gateway is not running, remote communication is not possible. The built-in watchdog will restart Meter Gateway if it should become non-responsive. Restarting Meter Gateway has no impact on PQ data capturing and recording.

Under certain conditions it may become necessary to restart it manually via Osprey Lite. To restart the Meter Gateway service:

- 1) Open **Communication** → **Manage Instrument**
- 2) Select the target instrument
- 3) Verify that the correct serial number is shown
- 4) Select **Restart Meter Gateway Service** under the **Control** section
- 5) Click **Execute**

The instrument will be disconnected and may be reconnected in 30 seconds.

20.1.3 Restarting an Instrument Remotely

To restart an ImpedoDUO:

- 1) Open **Communication** → **Manage Instrument**
- 2) Select the target instrument
- 3) Verify that the correct serial number is shown
- 4) Select **Restart Instrument** under the **Control** section
- 5) Click **Execute**

20.1.4 Factory Restarting an Instrument Remotely

To reset an instrument to its factory shipped settings (deleting all data and user configured changes on the instrument):

- 1) Open **Communication** → **Manage Instrument**
- 2) Select the target instrument
- 3) Verify that the correct serial number is shown
- 4) Select **Reset Instrument** under the **Control** section
- 5) Click **Execute**

Note: This step cannot be undone once commenced and will result in an automatic instrument reboot.

20.2 Firmware Updates

Osprey Lite only supports firmware updates for the ImpedoDUO and Vecto II. Firmware upgrades are developed and distributed directly by CT Lab and is shipped in the form of a firmware upgrade package. Follow the steps below to install a firmware update:

- 1) Place the firmware on a physical drive where Osprey Lite is installed
- 2) Open **Communication** → **Update Firmware**
- 3) Select the instrument to be updated (it must be online)
- 4) Verify that the correct serial number is shown in the **Update Firmware** view
- 5) Select the package path (where the firmware was placed on the local machine)
- 6) Click **Update**

To show the versions of the installed firmware, perform the following steps

- 1) Open **Communication** → **Update Firmware**
- 2) Select the instrument to be updated (it must be online)
- 3) Verify that the correct serial number is shown in the **Update Firmware** view
- 4) Click **Show Installed**

20.3 System Preferences

Various system preferences can be set from **Setup** → **Preferences**.

- The user interface language (**Preferred Language**)
- The fleet password (see Section 4.1)
- Continuous download and the download interval
- Whether to time synchronize Vectographs and Provographs during download
- Whether DOCX reports should export graphs as images
- The default width of the trend graph viewer.
- The maximum number of data points to plot for Events or Trends.
- The delimiter to use when exporting Osprey Lite data as text (CSV): this may be either a comma or a TAB.
- The minimum severity of Osprey Lite log entries that will be persisted to the database.
- Where to store brute force database downloads
- The aggregation period for billing trends (one of 5, 15, 30, or 60 minutes)

21 Glossary

CSV	-	Comma Separated Values
GUI	-	Graphical User Interface
Instrument	-	A physical device such as ImpedoDUO containing 2 meters
IP	-	Internet Protocol
LAN	-	Local Area Network
Meter	-	A logical measuring unit that records data
Meter Point	-	A physical measuring point at which data is recorded by a meter
Online/Offline	-	An instrument is connected/not connected to Osprey Lite
PQDIF	-	Power Quality Data Interchange Format
RMS	-	Root Mean Squared
UDP	-	User Datagram Protocol
WAN	-	Wide Area Network