

Quick Start Guide

VECTO

What's in the Box?

VECTO

1

VECTO3 Instrument



2

Connector Blocks and Screwdriver



3

Ethernet Cable



4

Flash Drive

Contains Meter Key and Manuals



5

Cellular and WiFi Antenna



6

GPS Antenna, Mounting Bracket, and Extension Cable



8

Split-Core Transducers (optional on order)



8

19" Rack Mount Plate (optional on order)



9

Installation Kit (optional on order)

10

Possible other items ordered



Installation

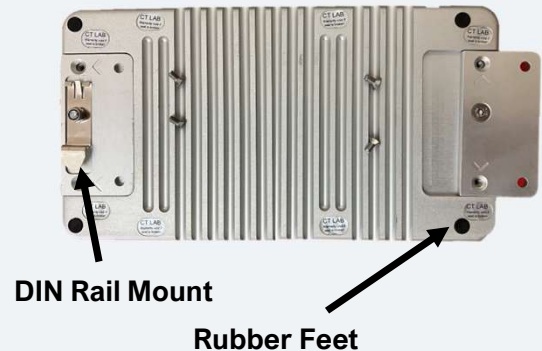
VECTO

This section will cover the basic installation of the VECTO3⁴ instrument. Instructions will be outlined to walk you through the essential steps to install your power quality instrument quickly and correctly. Ensuring proper installation is crucial for accurate measurements and reliable performance. Follow these instructions carefully to get your VECTO3⁴ up and running with minimal effort.



1 Mounting

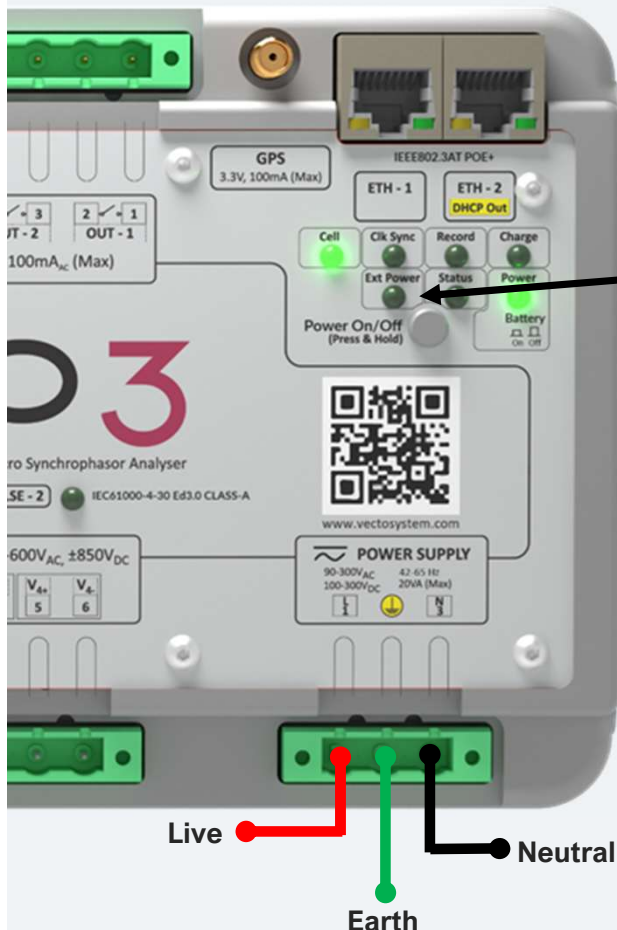
- 1 If the instrument needs to be mounted: Flip over the instrument and screw on the included mounting plates



- 2 Choose your mounting option and fasten the mounting plates accordingly.

2 Connect Power Supply

- 1 Connect earth first, and always connect the VECTO3 to a grounded earth connection
- 2 Connect power to either the 3-way connector block or power the instrument with POE from either ethernet port 1 or port 2
- 3 Check that "Ext Power" LED is lit. This LED means that external power is present.

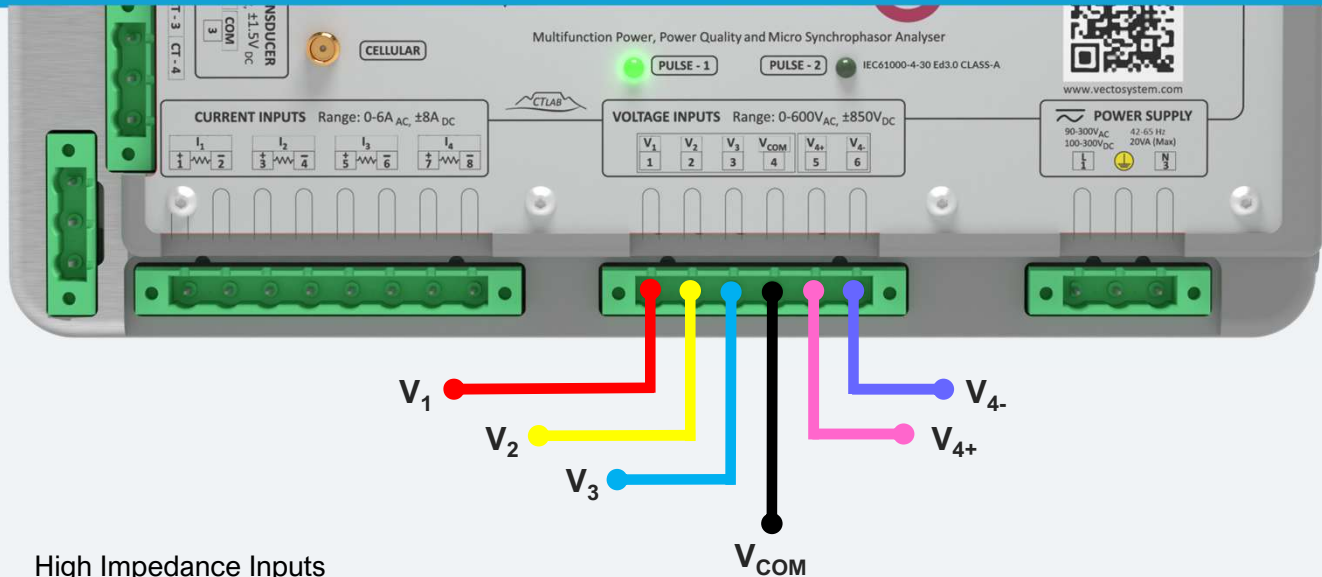


**Three way connector
Input options:**

AC 90V - 300V
DC 100V - 300V
25 VA (max)

Alternative:
POE | IEC-61500-2-2

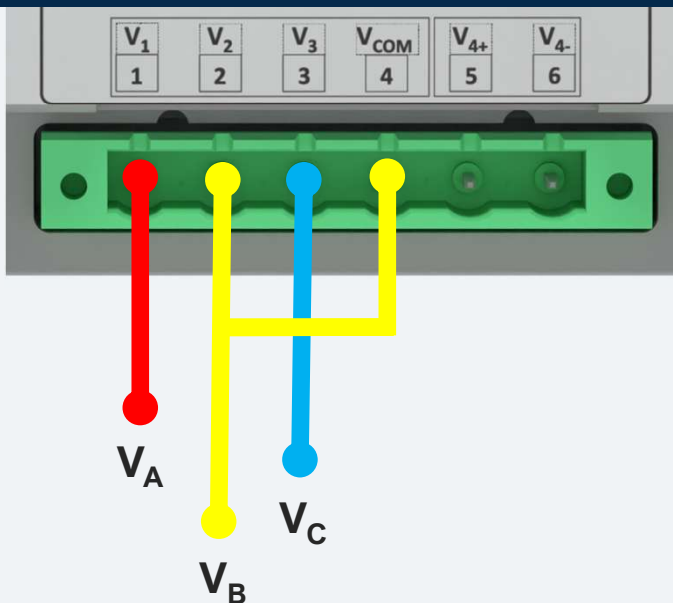
3 Connect the Voltage Inputs



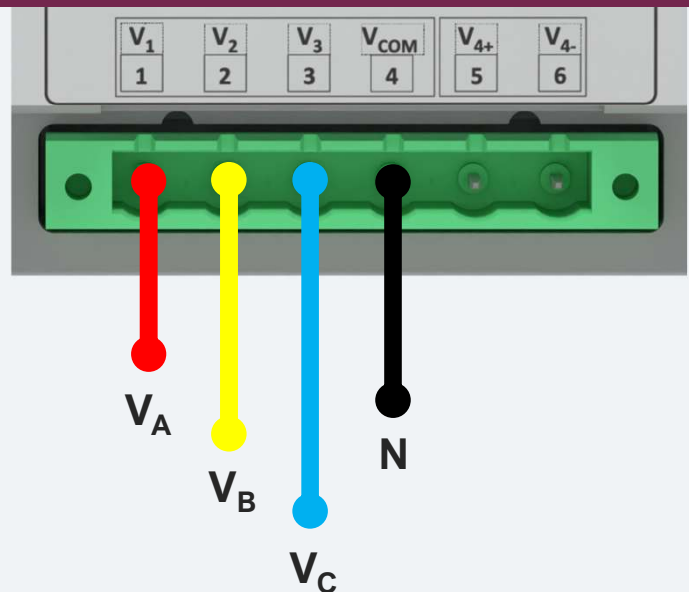
- High Impedance Inputs
(with floating reference)
- Line to Neutral Voltage Limit: $600 V_{LN}$
- Line to Line Voltage Limit: $1000 V_{L-L}$
- DC Voltage: $\pm 850 V_{DC}$

Voltage Connection Topologies

Delta Connection



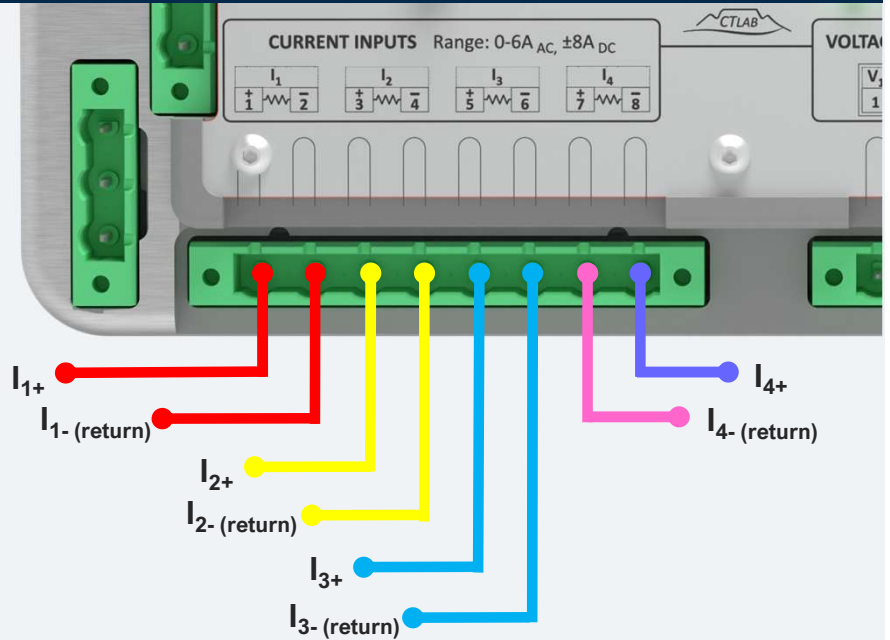
Star (WYE) Connection



4 Connect the Current Inputs

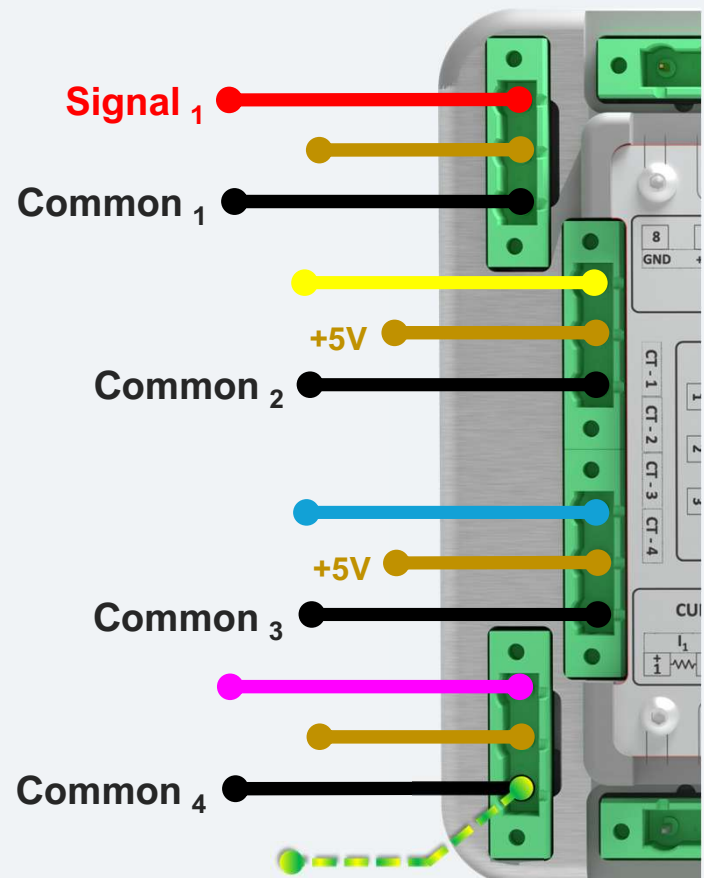
Option 1: Current Sensors

- Galvanically Isolated Current Inputs
- Input Range AC: 0-6 AAC
- Input Range DC: ± 8 ADC
- For 1 Second Withstand: 50A



Option 2: Current Transducers

- Galvanically Isolated Current Inputs
- Input Range AC: 1VAC RMS
- Input Range DC: ± 1.5 VDC



5 Connect GPS (recommended)

Connect the GPS directly or via the extension cable to the GPS SMA connector on top of the instrument next to the ethernet ports.



GPS Dome Antenna



GPS Magnetic Antenna



- GPS is needed to measure time (100ns time accuracy)
- Predominantly Clear Sky View
- Maximum of 100m extension for the GPS

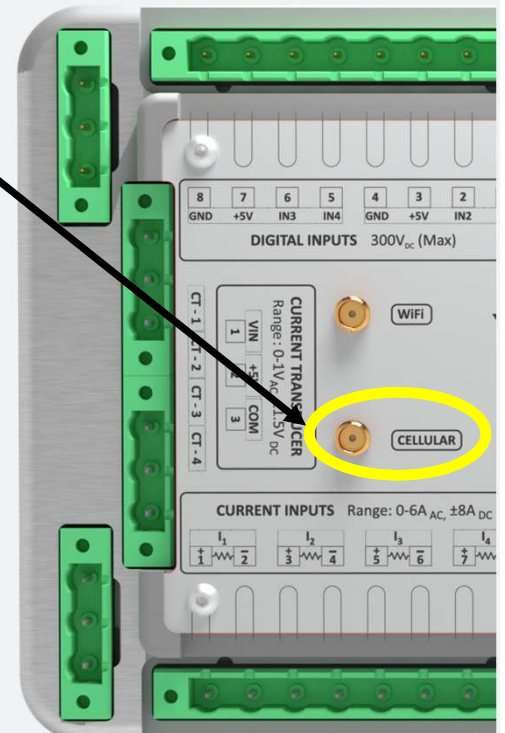
6 Cellular Antenna (optional)

Connect the Cellular antenna to the “Cellular” connector.

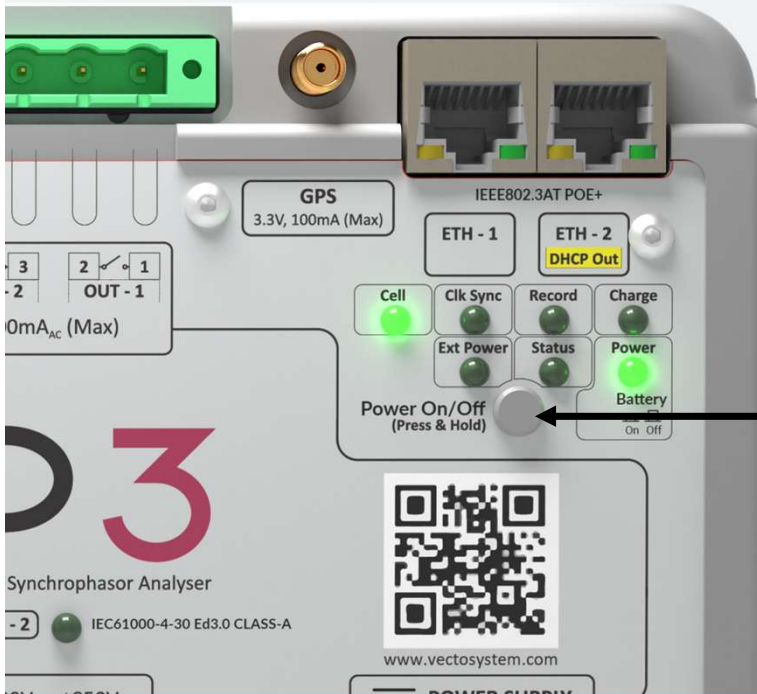
- CT LAB Sim-Card use Vodacom signal. Ensure that there are Vodacom signal available
- The GPS extension cable can also be used to extend the cellular antenna.
- For communications setup please the VECTO3 manual



Cellular Whip Antenna



7 Power on the VECTO 3⁴



NB! Exercise caution with the buttons; avoid using excessive force.

- Power up the VECTO 3 by holding the power button down until the status LED starts flashing orange
- When the status LED is flashing green the instrument is booted and running.

8 Connect Networking (Optional)

The diagram illustrates the connection of a VECTO 3 Multifunction Power Analyzer to a power source and a load. The power source is a 36V DC supply, which is connected to the VECTO 3 via a POE Injector and two fuses. The load, represented by VTs (Voltage Transformers), is connected to the VECTO 3 via three fuses. The VECTO 3 is connected to Earth ground.

Measurement Point Configuration



This section of the guide will cover the basic configuration, and the setup of a measurement point on the VECTO3 instrument. Please see the manual for more details on the measurement point setup.

The screenshot shows the VECTO3 Web Interface (HMI) with a dark blue navigation bar at the top containing icons and labels for Home, Users, Real-Time, Status, Measurement Point, Comms, Manage, Data Deletion, Upload Scheduler, Firmware, Logs, Events, Exports, and Logout. Below the navigation bar, the page title "VECTO3 Web Interface (HMI)" is displayed. The main content area shows user information: "Logged in user: Super User (super), with role Super User", "Serial Number: Mon000010021", "Hardware version: Vecto III (Rev 4)", "Software version: 9.4.0", and "Calibration Date: 2024-07-11". A "Documentation" section follows, listing links for "Vecto 3 User Manual (Local)", "Vecto 3 User Manual (Internet)", and "Vecto 3 SCADA Interface Manual".

CTLAB

Home Users Real-Time Status Measurement Point Comms Manage Data Deletion Upload Scheduler Firmware Logs Events Exports Logout

VECTO3 Web Interface (HMI)

Logged in user: **Super User (super)**, with role **Super User**
Serial Number: **Mon000010021**
Hardware version: **Vecto III (Rev 4)**
Software version: **9.4.0** ⓘ
Calibration Date: **2024-07-11**

Documentation

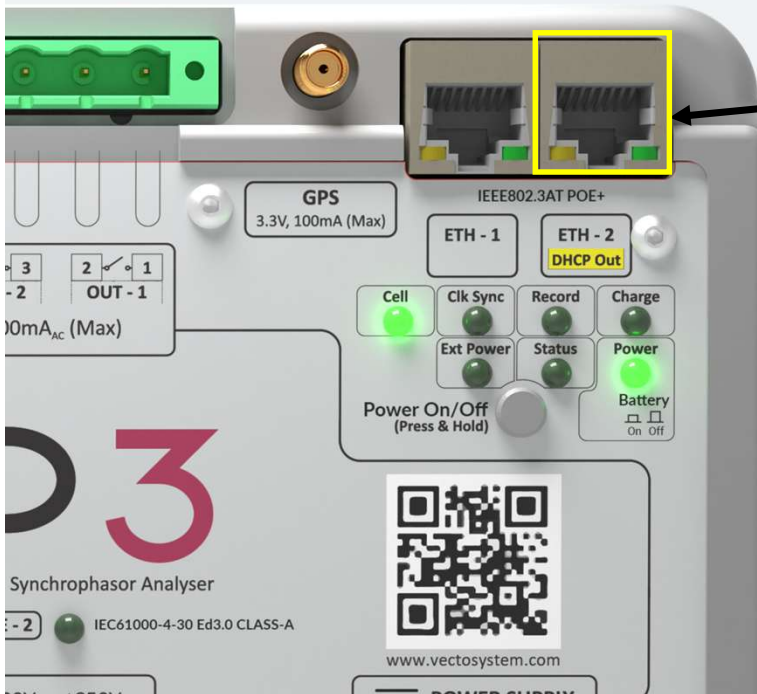
- [Vecto 3 User Manual \(Local\)](#)
- [Vecto 3 User Manual \(Internet\)](#)
- [Vecto 3 SCADA Interface Manual](#)

Configuration

Measurement Point Setup

VECTO

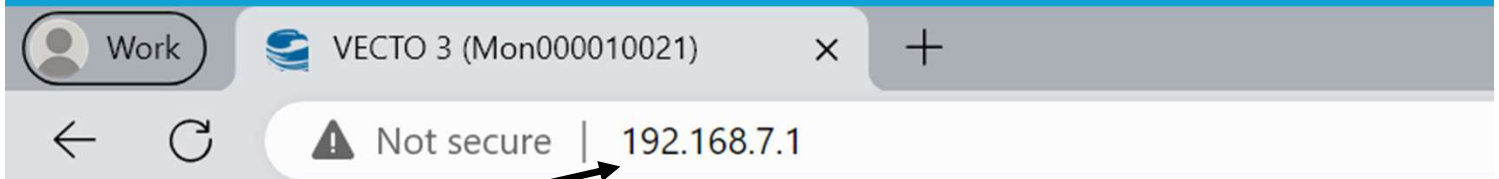
1 Connect Computer to Ethernet 2



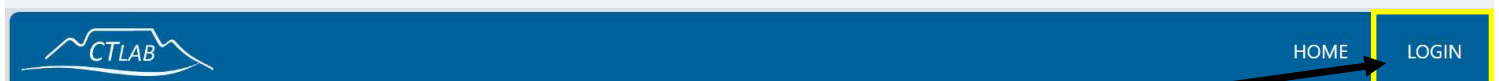
Connect your computer the ethernet port 2 to communicated and setup the instrument.

Ethernet port 2 acts as a DHCP server which will assign an IP address to your computer. The default gateway IP is the VECTO instrument which is: **192.168.7.1**

2 Access Web Interface (HMI)



1 Type in the default IP Address (192.168.7.1) into your web browser of choice



2 Click the "Login" button on the top right of the window

3 Enter the default username and password in the table below and click "Login"

Default Username	Default Password
super	Stellenbosch:7600

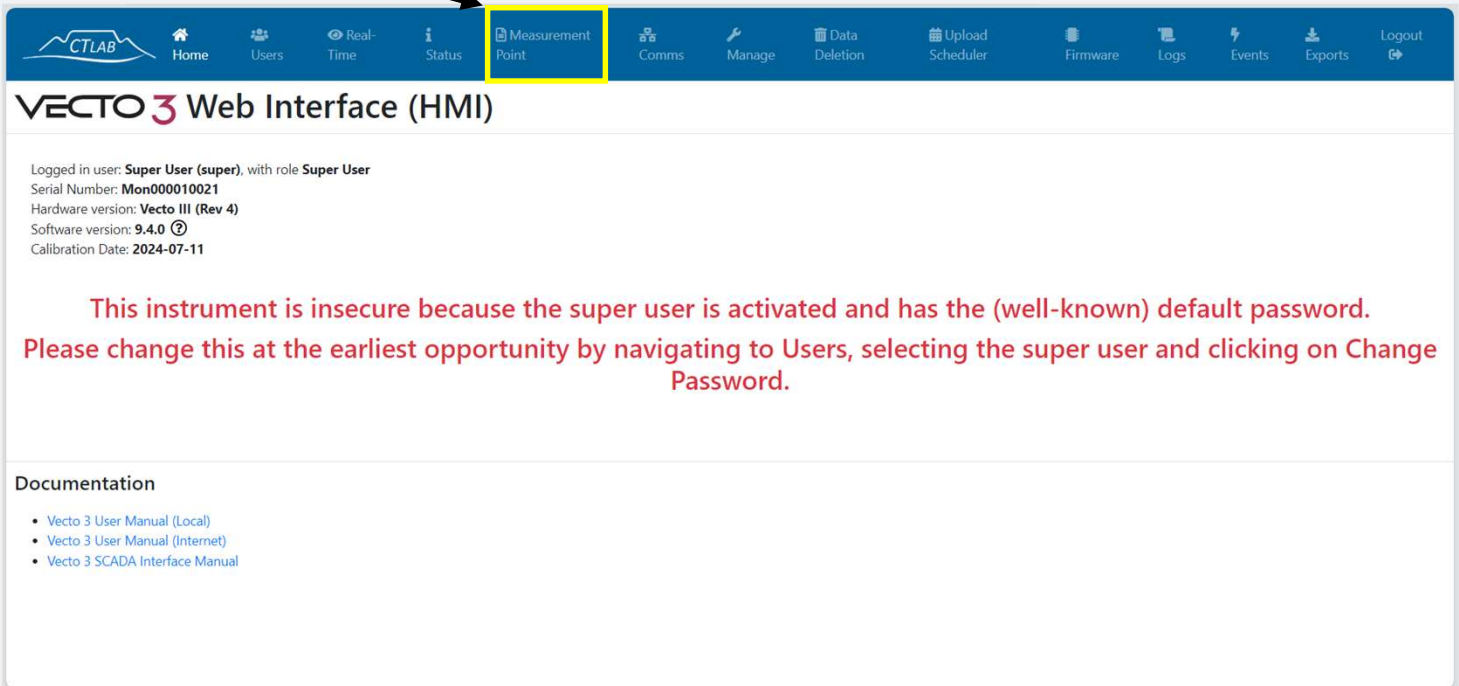
Configuration

Measurement Point Setup

VECTO

3 Navigate to the "Measurement Point" Tab

Click on the "Measurement Point" tab on the top of the HMI to navigate to the measurement point setup page.



The screenshot shows the VECTO 3 Web Interface (HMI) with the "Measurement Point" tab highlighted in the top navigation bar. The interface includes a header with the VECTO logo and a navigation bar with various tabs: Home, Users, Time, Status, Measurement Point, Comms, Manage, Data Deletion, Upload Scheduler, Firmware, Logs, Events, Exports, and Logout. Below the navigation bar, the page title "VECTO 3 Web Interface (HMI)" is displayed. The main content area shows the user is logged in as "Super User (super)" with role "Super User". It also displays the serial number "Mon000010021", hardware version "Vecto III (Rev 4)", software version "9.4.0", and calibration date "2024-07-11". A red warning message states: "This instrument is insecure because the super user is activated and has the (well-known) default password. Please change this at the earliest opportunity by navigating to Users, selecting the super user and clicking on Change Password." Below the warning, there is a "Documentation" section with links to the Vecto 3 User Manual (Local), Vecto 3 User Manual (Internet), and Vecto 3 SCADA Interface Manual.

4 Populate the Details section

Measurement Point Setup ?

Details Supply Interface Configuration Digital IO

Overview ?

Name

Select a name for your measurement point

Example Measurement Point Name

Description

Enter a description of the measurement point.

Example: This is the main incomer of the plant on the 11kV side. This measurement point is located in panel A-51 in Sub A. Contact Emile Raad for more information

Then click the next button

Next

Revert

Revert to Previous...

Configuration

Measurement Point Setup

VECTO

5 Populate the Supply Details

Measurement Point Setup ?

Details

Supply

Interface

Configuration

Digital IO

Example Measurement Point Name

Supply Configuration ?

Topology

1

☐ 3 Phase L-N (Star/Wye) ☒ 3 Phase L-L (Delta) ☐ Single Phase AC ☐ Single Phase DC ☐ 3 Phase L-L Voltage and Phase Current

Wiring

2

☐ 4-Wire Voltage Connection (Neutral Connected to V_Ref / V_Common)

☒ 3-Wire Voltage Connection (L2 connected to V_Ref / V_Common)

Frequency

3

50Hz

Voltage Level Options

4

Voltage Level

11kV



11000

V

Declared Voltage

5

11200

V

2% difference to voltage level

Next

Back

Revert

Revert to Previous...

1 Select your network typology

This is the type of topology you want to measure in.

2 Select your wiring topology

This is how your instrument is installed. You can measure in delta while you are connected in star, but not the other way around.

3 Select your frequency

Nominal frequency of your network.

4 Select your voltage level

What is the voltage level of your network.

5 Specify the declared voltage

This is the declared voltage of your system. The exact voltage that you expect on your point of supply.

6 Click the "Next" button

Configuration

Measurement Point Setup

VECTO

6 Populate the Voltage Measurement Interface Parameters

Voltage Measurement ?

Link Channels ☒ 1 - 3

VT Ratio

Channel 1 - 3 **1**

100 V: 1 V

Channel 4

1 V: 1 V

meter_point_setup.fields.max_volt_reading ?

Channel 1 - 3 **2**

15000

Channel 4

150

Voltage Channel Mapping

Physical Meter Input	One	Two	Three	Four
Logical Phase Colour	Red (1) ▼	Green (2) ▼	Blue (3) ▼	Black (4) ▼

Unconnected Channels (Force to Zero) **3**

☐ Channel 1 ☐ Channel 2 ☐ Channel 3 ☐ Channel 4

1

Enter your VT Ratio

This is the ratio of any VT connected to the voltage inputs. Ex: An $11\text{kV}/\sqrt{3}:110\text{V}/\sqrt{3}$ is equal to 100V:1V

2

Select the maximum voltage that will be measured

Select the maximum voltage that will be measured to optimize the dynamic range of the measurement

3

Mark if there are any unconnected channels

Configuration

Measurement Point Setup

VECTO

7 Populate the Current Measurement Interface Parameters

Current Measurement 

Enabled 

Link Channels  1 - 3

Derived Channel  Select if you are deriving any channels

None 

Channel 1 - 3

Primary Current at Full Load   Enter the primary current at full load. You can enter the maximum value that the CT can measure.

200

A

Interface  Choose current measurement interface: Current Transformer (Option 1) or Transducer Inputs (Option 2) or as per the current input installation page

Transformer (A:A) 

Transformer Primary

Transformer Secondary

200

A :

5

A

 Enter the CT ratio or the CT and transducer ratio depending on the interface selection.

Channel 4

Primary Current at Full Load 

1

A

Interface

Direct 

Invert Current Polarity  Invert any of the current measurement channels if required.

☐ Channel 1 ☐ Channel 2 ☐ Channel 3 ☐ Channel 4

Current Channel Mapping

Physical Meter Input

One

Two

Three

Four

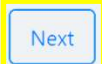
Logical Phase Colour

Red (1) 

Green (2) 

Blue (3) 

Black (4) 

 Next

Back

Revert

Revert to Previous...

 Click the "Next" button

Configuration

Measurement Point Setup



8 Recording Configuration

Measurement Point Setup ?

Details Supply Interface Configuration Digital IO

Example Measurement Point Name ?

Ten Minute Trends

- ☒ Enable
- ☒ Enable Harmonics
- ☒ Enable Min/Max Values

Min/Max RMS calculated over 1 cycle ☐ 200 ms ?

Specialized Trends

- ☐ Enable 10s Frequency
- ☐ Enable Billing

Advanced Settings ?

1/6th Cycle Interval Monitors ?

- ☒ Three-Phase Voltage Dip/Swell
- ☐ Current Exceedance
- ☐ Level Detection (Volt Channel 4)

10/12 Cycle Block Interval Monitors ?

- ☐ Voltage Distortion (THD) Exceedance
- ☐ Voltage Unbalance Exceedance
- ☐ Mains Signaling
- ☐ Over/Under Frequency
- ☐ Rate of Change of Frequency (ROCOF) Exceedance

50kHz Monitors ?

- ☐ Digital IO
- ☐ Voltage Transient

Ten Minute Interval Monitors

- ☐ Voltage Distortion (THD) Exceedance
- ☐ Voltage Unbalance Exceedance
- ☐ Voltage Regulation Exceedance

Extensions

Maximum number of events to capture per hour

Next

Back

Revert

Revert to Previous...

The default configuration is set to the NRS048 (South African Quality of Supply) **directive**. The configuration can be left on default. Otherwise select all the required data streams and monitors to be activated in this window. Click the “Next” button when done.

9 Setup Digital IO

Please see the manual (on the included flash drive) for more details about the setup of the digital IO.

Click the “Next” button when done.

10 Save the Measurement Point Configuration

Save

Back

Revert

Revert to Previous...

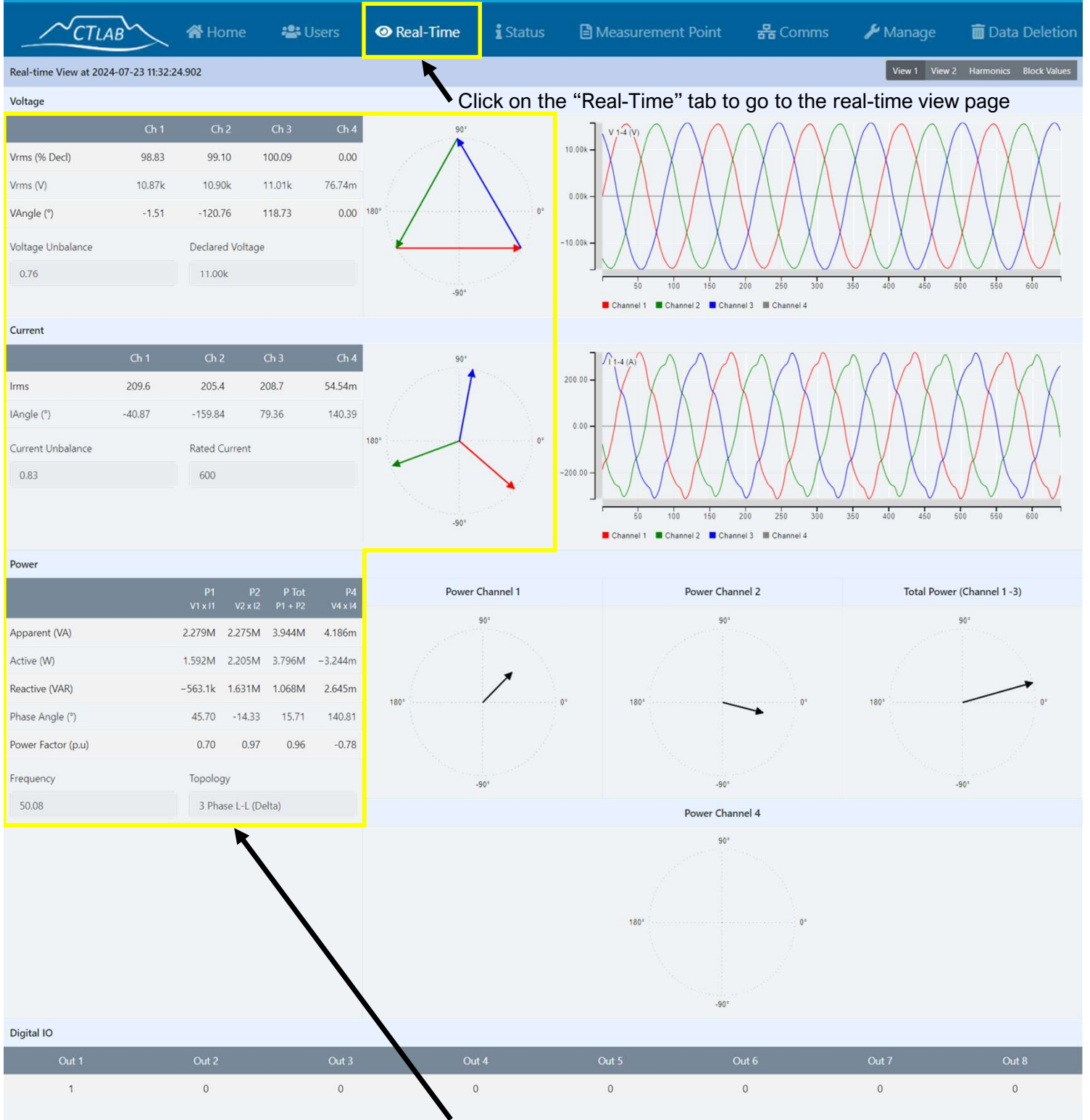
Click the “Save” button when done.

Configuration

Measurement Point Setup

VECTO

9 Real-Time View



Frequently Asked Questions **VECTO**

How do I power ON the device

Apply external power—wait for the EXT PWR LED to light up—lightly press the START UP SHUT DOWN button on the front panel until the STATUS LED turns orange. Release the button; the device will boot up, and if properly configured, the STATUS LED will flash green and the RECORD LED will turn green.

I lost my Meter-Key - now what?

CT LAB offers robust device security. We can only send you a key-file once we have identified ownership of the device. Send an email to info@ctlab.com with your name, instrument serial number, contact details, and company. CT LAB will then review your information, and the meter key will be re-issued.

Why do I need a Meter-key?

No key-file is required when using the built-in web interface; however, the key-file is required to activate the interface. All IP-based communication is encrypted—the 128-bit key-file is required to decode the device data.

What does the LEDs mean?

STATUS	Flashing Orange—Device booting or shutting down Toggle Orange > Green > Orange—Device has lost external power and the shutdown counter is running while device is on battery power. Flashing Green—Measurement point attached and device recording
RECORD	Off—no measurement point attached. Orange—device is recording an event. Green—measurement point attached.
CLOCK SYNC	Off—no external time source found yet. Orange—NTP time locked. Green—GPS or PTP time locked.
CELLULAR	Orange—SIM and network found. Green—connected to cellular network.

Will the VECTO 3 power on by itself after a power failure?

VECTO devices keep track of how they are powered down. When external power is lost, the device will be powered for ± 5 min. Thereafter, it will shut down. On return of external power, the device will automatically power up. When shut down manually, the device will stay down during power cycles.

How long does the battery last?

5 minutes by default. This value can be changed by the user in the HMI under "Manage" > "Battery Ride Through" to a value of 10s to 1 hour.

How do I change the IP Address of ETH1?

On the HMI go to the "Comms" tab and see the "IP Version 4, IP Version 6, or Local/DHCP Port (ETH2)" sections to change or configure a static or DHCP IP for ETH1.

How to enable the Cellular Modem?

On the HMI, go to the "Comms" tab and see the 'IP Version 4', 'IP Version 6', or 'Local/DHCP Port (ETH2)' sections to change or configure a static or DHCP IP for ETH1.

How to enable the Wi-Fi module?

On the HMI go to the "Comms" tab and see the "Wi-Fi" section where the Wi-Fi can be enabled and configured.

How to see if GPS/PTP is locked?

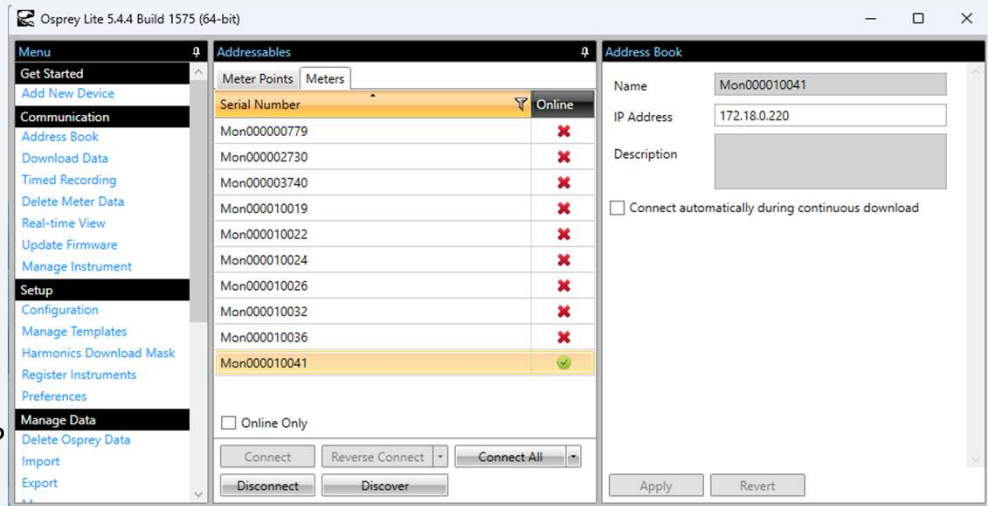
On the HMI go to the "Status" tab and click the "Read" button. Check if the "Time Source" field shows GPS. Check the "Time Subsystem" output for the GPS line if the GPS has a time (most right column).

1 Establish Connectivity

In Osprey Lite

- Register your new device by loading the key-file
- The registered device will appear under the Meters tab.
- If you know the IP address of the device, then type in address and Apply.
- Press Connect button
- A green circle will appear when connected
- If you do not know the IP of the device (typically when connected to a corporate network) then press the Discover button.
- A green circle will appear when connected

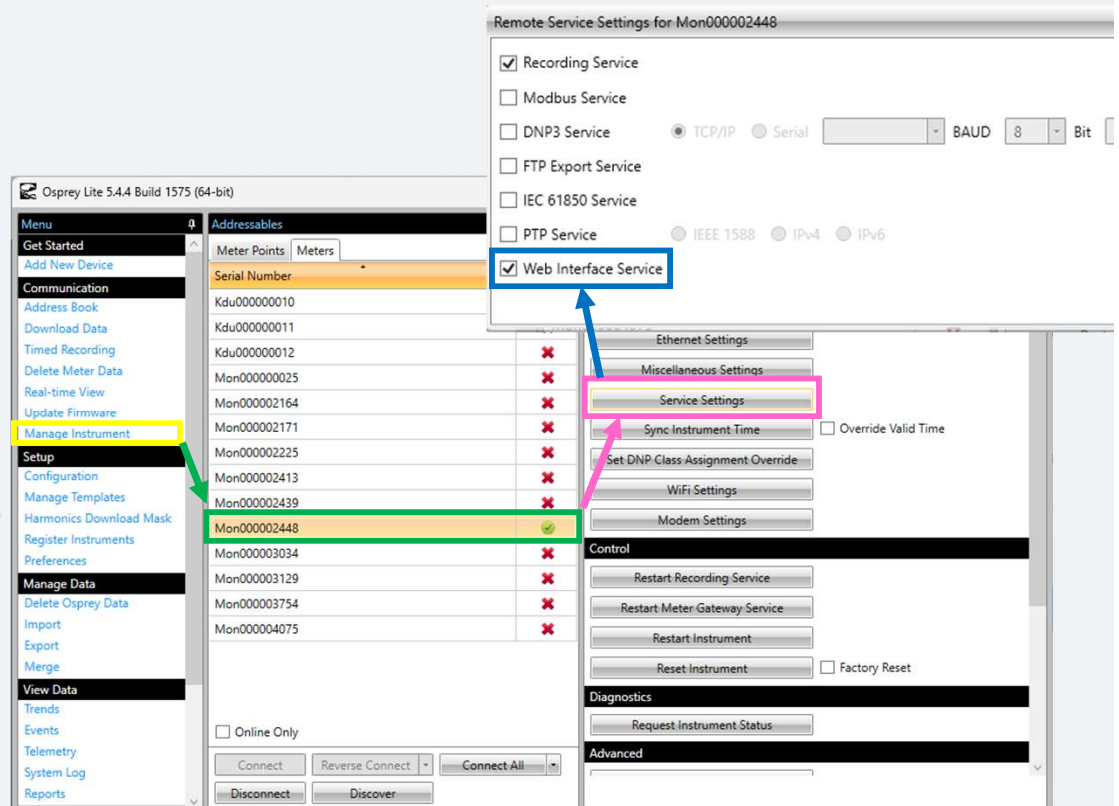
Osprey Lite is support software bundled with each VECTO device.



2 Activate HMI using Osprey Lite

In Osprey Lite

- Register your new device by loading the key-file
- Setup your IP address in the Address Book
- Establish communication
- Go to "Manage Instrument"
- Select the connected device
- and in the "Service Settings" menu
- enable "Web Interface Service"



For more information:
www.vectosystem.com

For technical support:
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