# RAPIDLY DEPLOYABLE POSITIONING SYSTEM

User Manual Version 1.1

CT SYSTEMS

# COPYRIGHT



The purpose of this manual is to give the users of the Viking software information on the use of this software.

This manual may not be considered as a document with which CT Systems could have any responsibility, legal liability or contractual obligations.

# WARNING

An experienced and careful navigator would never trust on just one expedient when determining his position, because the accuracy of the position, which is plotted on the chart, depends on the navigation device.

The Viking software is a precision instrument, which is linked to a receiver. When there are interferences in the radio signals, the position on the chart may not match with the real position. With the CT Systems software you can make corrections regarding position, if there is a point from which the coordinates are known.

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# Chapter 1: Introduction

## 1.1 About This Manual

This manual is intended as a documented guide for installation, set up and use of the RDPS. Using the alphabetical index features and settings can easily be looked up.

We recommend reading this manual fully in order to get acquainted with the workings of the RDPS.

The RDPS, RDI, GeoGNSS, GeoGNSS RDPS, and the Viking Software are all products of CT SYSTEMS BV from The Netherlands.

## 1.2 About RDPS

The Rapidly Deployable Positioning System (RDPS) is designed and built to be a portable and complete system for precise positioning operations. With all components fitted in a rugged and portable Peli Case, showing up on a vessel with only the RDPS will assure you of exact positioning of any vessel.

The RDPS comes with highly accurate DGNSS, GNSS compass, AIS, UHF telemetry, industrial Wi-Fi, rugged notebook, Viking positioning software and all required adapters, cables and antennas. All in one box!

The philosophy behind the RDPS is that it should be portable, easy to deploy, and easy to use. The concept is that the hart of the system, the GeoGNSS RDPS, is to be installed outside, eliminating the need for long antenna cables.

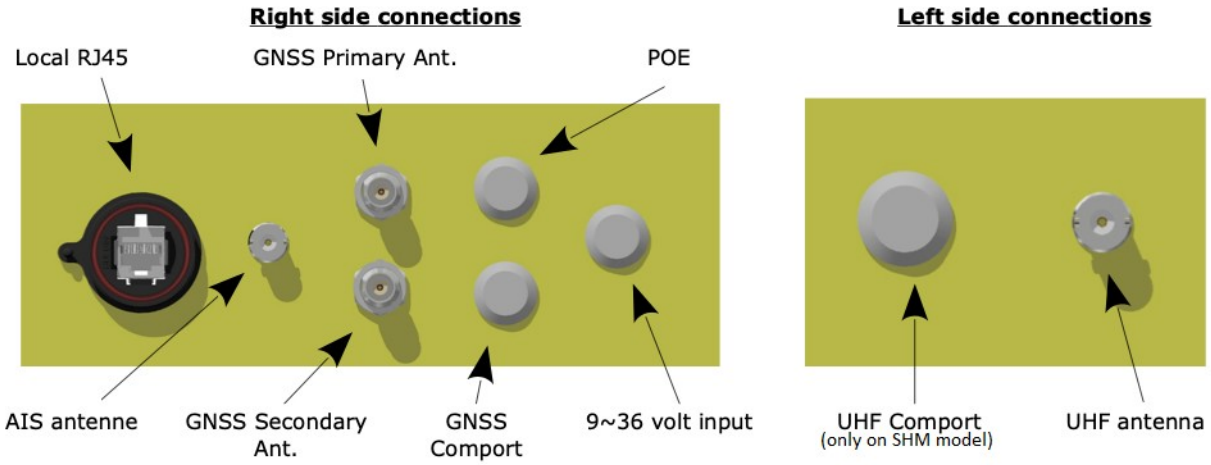
An additional benefit of having the GeoGNSS RDPS located outside is that no cables need to be routed to the bridge or control room. All communications can go through long rang Wi-Fi, or if needed by a single and widely available RJ45 ethernet cable.

Simply position the GNSS, Wi-Fi, AIS and optional UHF antennas outside, connect all to the GeoGNSS RDPS. Then the notebook running Viking will connect to the Wi-Fi antenna directly and gather all data. The GeoGNSS RDPS has a wide input DC power supply enabling many options for power sourcing.

## 1.3 Telemetry Data

Always ensure you have followed local regulations concerning wireless transmissions! Where applicable unsure you have the appropriate license(s).

## 1.4 Physical Connections




!Always connect the UHF antenna when the unit is powered on!

## 1.5 Schematic

### System Overview


Wireless Wi-Fi
Data to Viking
GNSS Antenna 2
GNSS Antenna 1
UHF
GeoGNSS RDPS
AIS
PoE WiFi

# Chapter 2: What's In The Box

## 2.1 System Contents

The RDPS is built up out of the follow components:

| *Quantity* | *Product* |
|---|---|
| 1 | Peli Case 1610 with foam inserts |
| 1 | Dell Rugged Latitude + Power Adapter |
| 1 | Viking Offshore Software (USB Dongle) |
| 1 | GeoGNSS RDPS (Peli Case 1200) |
| 1 | Wi-Fi Bullet |
| 2 | Trimble LV59 GNSS Antenna |
| 1 | Procom UHF Antenna |
| 1 | Procom Wi-Fi Antenna |
| 1 | AIS Antenna + Magnet Mount |
| 2 | Marine Antenna Bracket LV59 |
| 2 | Procom Antenna Bracket |
| 2 | RG223 GNSS Coax Cable, 5 metre, TNC/TNC |
| 1 | RG223 UHF Coax Cable, 5 metre, TNC/N |
| 1 | RG58 AIS Coax Cable, 5 metre, BNC/FME |
| 1 | CT-Lemo PoE Cable Lemo 8p, 5 metre |
| 1 | CT-Lemo Serial RS232 Cable (only for SHM model) |
| 1 | CT-Lemo Power Cable + Adapter |
| 1 | Ethernet Cable RJ45 1.5 metre |

## 2.2 Security Hardware Key

The Viking software package is protected by a HASP USB security key. In order to run Viking a HASP key supplied by CT Systems needs to be inserted into a functioning USB port of the computer.

The HASP key will also contain digital keys for various special functions in the Viking software.

**WARNING**

In case of a loss of the HASP key the replacement of this key requires a full re-purchase of the licensed software!

## 2.3 System Components Packaging

Top Layer

Middle Layer

Bottom Layer

# Chapter 3: Mobilisation

## 3.1 Setting Up The RDPS

- Find a suitable and fixed spot where both GNSS antennas have a good and uninterrupted view of the full horizon, placing both GNSS antennas as far apart as possible. Connect both using the TNC/TNC RG223 cables to the GeoGNSS RDPS.

- Connect the Wi-Fi Bullet to the Wi-Fi Procom antenna (make sure not to use the UHF Procom), and connect the CT-Lemo 8 pin PoE cable to the underside of the Bullet. Recommended to wrap the underside of the Bullet and part where the Bullet meets the Procom with vulcanising tape.

- Place the AIS antenna with the magnetic mount on a metal surface and connect to the GeoGNSS RDPS using the BNC/FME RG58 cable.

- If needed connect the UHF Procom to the GeoGNSS RDPS with the TNC/N RG223 cable.

- Make sure all antennas are upright and have as little obstructions around them as is possible. Recommended to keep line of sight between the targets/receivers of the antennas (i.e. between Wi-Fi Bullet and notebook).

- Power up the GeoGNSS RDPS using a 9~30 VDC continues power source.

- Install the notebook on the required location and connect it to the RDPS Wi-Fi network, and power up the Viking software.

## 3.2 Configuring Viking

Assuming Viking is still configured correctly and has all equipment already configured, and connected in the Equipment Manager the following steps are necessary for every new mobilisation:

- Set Viking to the Chart Datum and Projection used in your project with *Settings* → *Coordinate System* → *Change* and selecting the appropriate system. The active system is always shown in the bottom right of the Viking Screen.

- Using *Settings* → *Ship* → *Ship Layout* and by pressing *Create* a new vessel layout can be either drawn directly in Viking, or be imported from a DXF (in metres, front pointing to the right, close to local coordinates 0,0).

- Once the layout is imported or drawn the most important step is to enter the exact Fix Points for the GNSS antennas. Near the bottom left of the Ship Layout Editor click on the Fix Points tab and click on *Create Point* to create a new Fix Point in the drawing. Using the mouse you can place it on the exact location of each antenna, optionally using the X, Y & Z coordinates in the table below they can be fine tuned. Recommended to rename the Fix Points to the names of each GNSS antenna.

- Save the vessel layout with a unique name and make sure that name is selected on the left before pressing OK.

- Go to *Settings → Equipment Manager* and make sure that the Fix Point for the GPS is the fix point of the primary antenna. This can be changed by clicking on GPS and clicking Setup, then choose *Change Position* and select the correct fix point. Also check under Advanced in the GPS setup window that the correct Chart Datums are selected for each type of GPS fix.

- Where needed a heading offset can be given using *Settings → Equipment Manager → Heading → Advanced.*

**Optional But Recommended:**

- Create a dynamic object of the exact GNSS antenna location using *Managers → Object Manager → Create Object → (type) Viking → Ok*. Give the object a name and in the *sizes* field enter a number of radiuses (metres) for circles, each radius on a new line (for example 0.05, 0.25, 0.5) and press Ok.

- Select the newly created object from the list and press *Place Object*. Heading should be set to *Heading Fixed*, and under Source select the GPS receiver from the list and press Ok. Now the circle should be visible on the nav screen on the exact location of the GNSS antenna.

## 3.3 Position Check

**Recommended Procedure**

With the system now up and running a position check is highly recommended. Highly recommend is to do a position check using a stand alone and highly accurate GNSS, by comparing the output coordinates of the stand alone GNSS on various locations on the vessel with the coordinates that Viking calculates of those specific points.

**Alternative**

An alternative is to use the GeoGNSS RDPS itself for a position check. This alternative is not recommended and should only be used if no other means are available and common sense should be applied.

- Set up the dynamic object as described as optional here above.

- Make 100% sure the vessel is not moving!

- Draw an accurate outline around your vessel and mark points of the vessel which you want to check by selecting *File → Chart → Create New* then in the newly opened Left Hand Side Bar and using the built in Chart Editor. When finished save the outline as a Viking Chart.

- Go to *Settings → View → General → Ship* and set the line width to 0 (zero). Now Viking will no longer draw your vessels layout, but instead you should only see the dynamic object and the layout that you drew as a Viking Chart.

- Place the primary GNSS antenna (ignore the secondary for now) on strategical points on your vessel to check if they match up with the drawn overlay.

- Set the line width of the vessel back to 1 or higher (*Settings → View → General → Ship)*. The chart can be removed from the Right Hand Sidebar (F10 - Files).

# Chapter 4: Defaults & Software Installation

## 4.1 Default RDPS Settings

| | *RDPS SHM* | *RDPS WZN* | |
|---|---|---|---|
| IP Address Wi-Fi Bullet | 192.168.1.20 | 192.168.1.20 | |
| IP Address Wi-Fi notebook | 192.168.1.101 | 192.168.1.101 | |
| IP Address Ethernet notebook | 192.168.1.102 | 192.168.1.102 | |
| IP Address & Port Number GNSS Direct | 192.168.1.121:5017 | 192.168.1.121:5017 | GGA, GST, HDT |
| IP Address & Port Number GNSS GeoGNSS | 192.168.1.141:5017 | 192.168.1.141:5017 | Channel #1: 5017, 115200 |
| IP Address & Port Number UHF GeoGNSS | 192.168.1.141:5017 (*read only*) | 192.168.1.141:5018 | Channel #2: 5018, 19200 |
| IP Address & Port Number AIS GeoGNSS | 192.168.1.141:5017 | 192.168.1.141:5019 | Channel #3: 5019, 38400 |
| Wi-Fi Bullet Network Name | CT-RDPS | CT-RDPS | |
| Wi-Fi Bullet Network Password | 1122448811 | 1122448811 | |

## 4.2 New Viking Installation

In the event that a new PC is used or all settings are lost below is an overview of installing and setting up a new Viking software installation.

**Installing New Viking**

- Install newest Viking Setup FULL, followed by LATEST (if applicable)
- Run Viking and go to Settings → Equipment Manager
- Click Add → GPS → NMEA and Add, repeat this for:
  - Heading → NMEA
  - AIS Receiver → NMEA
  - Output → Viking

**Setting Ship Control**

- Settings → Ship → Ship Control, and select:

- Differential
- No Height
- No Draft
- GPS Device: GPS NMEA
- Heading Device: Heading NMEA
- No Motion

- In the backup tab you could for example have the same as above but for GPS set to Normal. In backup mode there is no logging or DTM update, just a position and a big warning on the screen

**Configuring Equipment**

- GPS NMEA:
  - Settings → Equipment Manager → Click on GPS NMEA → Click Setup (or double click on GPS NMEA)
  - Click Change Connection and select the appropriate COM, TCP or UDP and configure (use the Add button in bottom left to add TCP/UDP)
  - Using Calibrate set the correct Datum for each GNSS fix mode (important)
  - Select the appropriate Fix Point under Change Position (important)
- Heading NMEA
  - Settings → Equipment → Heading NMEA
  - Configure connection and optionally set a heading offset in Advanced
- Output Viking
  - Settings → Equipment → Output Viking
  - Configure connection

After installing a new Viking installation follow the instructions in the Mobilisation chapter above.

## 4.3 UHF Configuration

To configure the internal Satel modem the “Satel Configuration Manager” software is needed. It can be downloaded from the Satel website for free. More details on how to configure and program the satel can be found in the Satel user manual.

Important to note is that the baud rate (19200) of the internal satel should not be changed, and should match the internal channel number.

**SHM Model**

The SHM model is limited to being able only to read from the UHF data over TCP. For full two way access, or to program the Satel the CT-Lemo Serial cable is needed, and needs to be plugged directly into the RDPS on the left side.

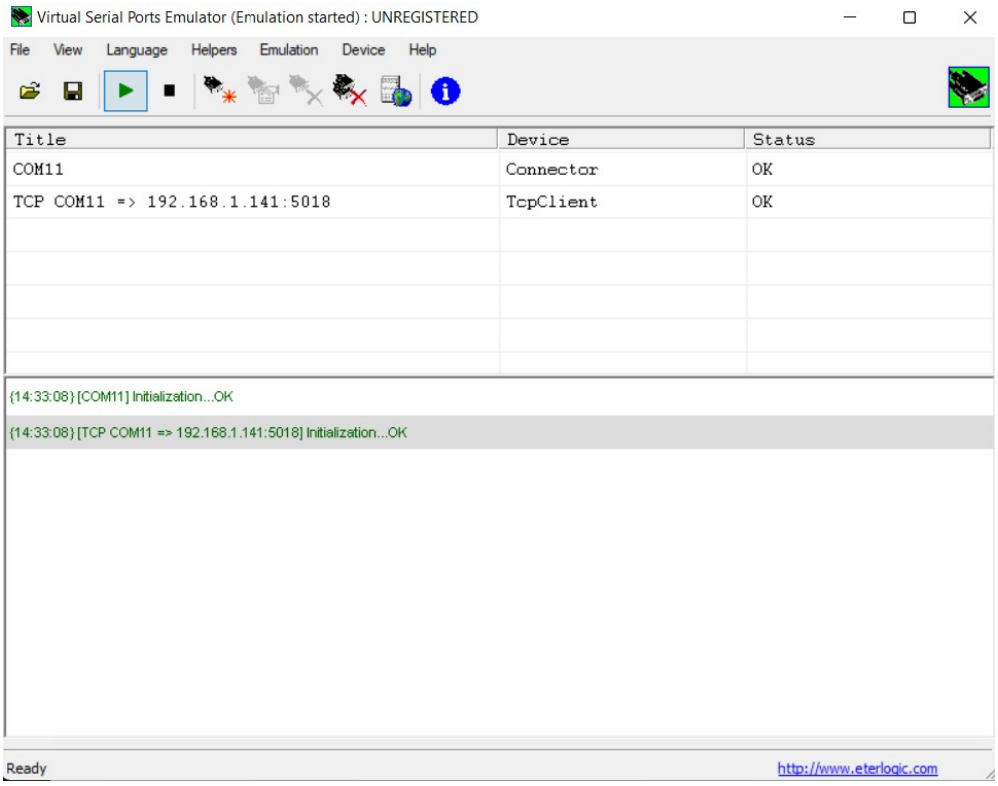
**WZN Model**

The WZN model has full read/write access to the Satel over TCP. This does however mean that for programming the Satel an extra step is needed as the Satel software is limited to only accessing Comports directly.

Using the VSPE software (available for free) a virtual comport can be created. This virtual comport can be connected to a TCP client to the port of the UHF in the RDPS.

In the Satel configuration software this comport can then be selected for direct programming.

Please note that the when configuring and starting VSPE Viking and all other software using the TCP connections of the RDPS should be closed!



# Chapter 5: Remote Data Interface

## 5.1 About

The Remote Data Interface (RDI) is an optional extension to the RDPS. The RDI also consists of a Peli 1200 with an internal industrial device server and coupled with industrial Wi-Fi. The RDI enables remote and direct access to additional sensors and positioning equipment.

## 5.2 System Contents

The RDI System is built up out of the follow components:

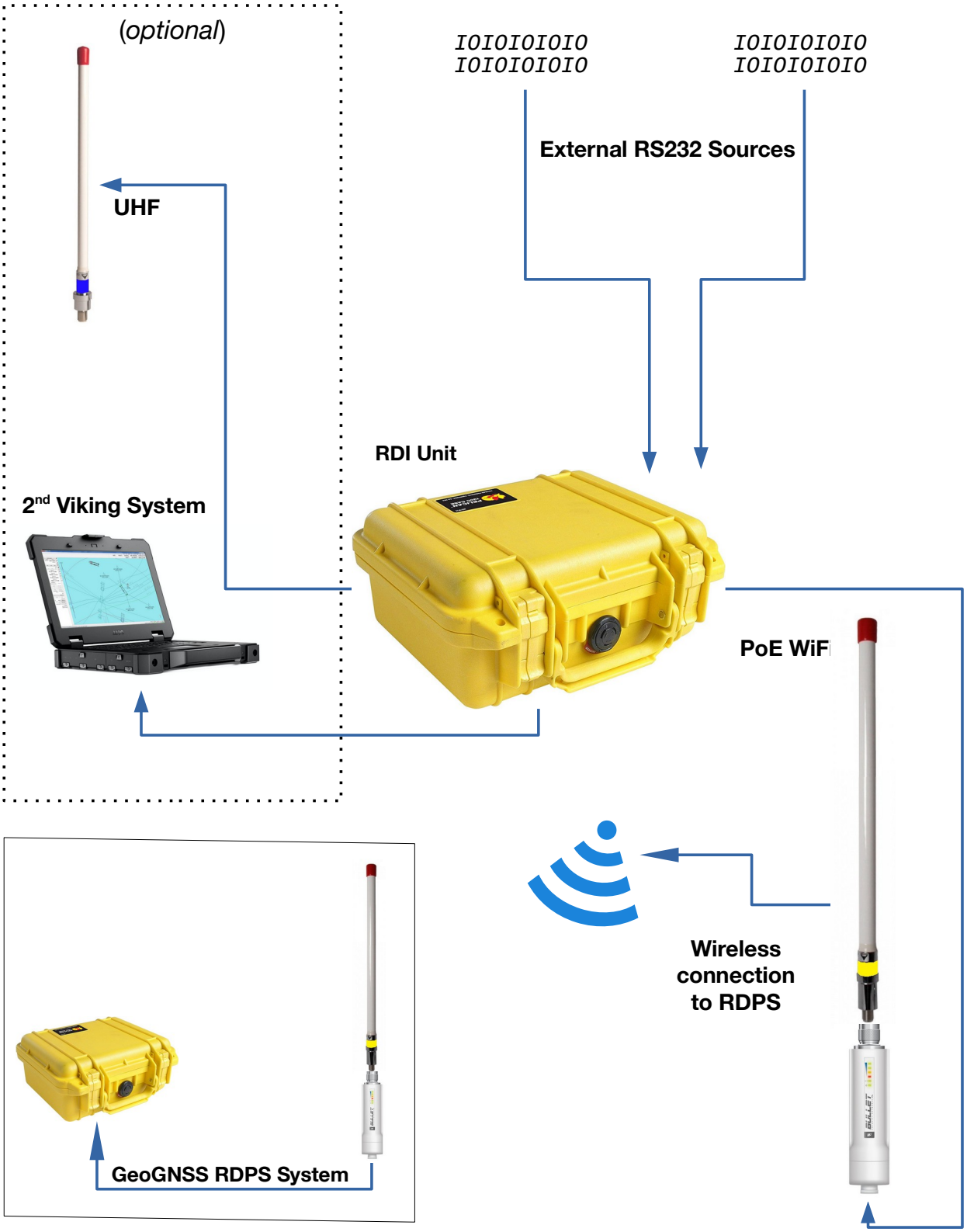
| ***Product*** | | ***Quantity*** |
|---|---|---|
| • Peli Case 1610 with foam inserts | | 1 |
| • Dell Rugged Latitude + Power Adapter | *optional* | 1 |
| • Viking Offshore Software (USB Dongle) | *optional* | 1 |
| • RDI (Peli Case 1200) | | 1 |
| • Wi-Fi Bullet | | 1 |
| • Procom UHF Antenna | *optional* | 1 |
| • Procom Wi-Fi Antenna | | 1 |
| • Procom Antenna Bracket | *optional* | 1 |
| • RG223 UHF Coax Cable, 5 metre, BNC/N | *optional* | 1 |
| • CT-Lemo PoE Cable Lemo 8p, 5 metre | | 1 |
| • CT-Lemo Serial RS232 Cable | | 2 |
| • CT-Lemo Power Cable + Adapter | | 1 |
| • Ethernet Cable RJ45 1.5 metre | | 1 |

## 5.3 Default RDI Settings

| | *RDI* |
|---|---|
| IP Address Wi-Fi Bullet | 192.168.1.21 |
| IP Address Wi-Fi notebook | 192.168.1.103 |
| IP Address Ethernet notebook | 192.168.1.104 |
| IP Address Device Server configuration local webinterface | 192.168.1.142 |
| Default Baud Rate (all comports) | 115200 |
| IP Address & Port Number Port 1 | 192.168.1.142:5300 |
| IP Address & Port Number Port 2 | 192.168.1.142:5301 |

| | |
|---|---|
| IP Address & Port Number Port 3 | 192.168.1.142:5302 |
| IP Address & Port Number Port 4 | 192.168.1.142:5303 |
| Wi-Fi Bullet Network Name | n/a, connects to CT-RDPS |
| Wi-Fi Bullet Network Password | 1122448811 |

## 5.4 Schematic System Overview



## 5.5 Configuration Examples

**Robotic Total Stations**

The RDI can be used to collect data from two robotic Total Stations enabling Viking to do relative positioning using the first total station for positioning and the second for heading reference.

- Install the robotic total station on the static reference object and install the reflectors on the dynamic object
- Make sure both total stations are working in the same XYZ local world (important)
- Make sure the external data sources are set to 115200 8N1 (otherwise use the local web interface of the device server in the RDI to edit the RDI settings itself)
- Connect the external data sources to the two Lemo Comports of the RDI
- Power up the RDI, it should automatically connect to the Wi-Fi of the RDPS
- Configure the Viking System on the RDPS system as follows:
    - Go to *Settings* → *Ship* → *Ship Layout* → *Fix Points* add the exact locations of the reflectors to the ship layout, name the first one POS and the second HDT
    - Add and configure the following equipment to the Viking Configuration:
        - *Settings* → *Equipment Manager* → *Add* → *GPS* → *Custom XYZ*, rename to POS
        - Repeat above for second Custom XYZ and rename to HDT
        - Configure the primary total stations data connection to the POS Custom XYZ, and set the position of the POS Custom XYZ's Fix Point to the POS Fix Point
        - Press *Advanced* and configure the parsers for X, Y & Z inputs from the total station
        - Repeat above for the HDT Custom XYZ and set to the secondary total station
    - Go to *Settings* → *Ship* → *Ship Control* and set the GPS device to POS Custom XYZ and the Heading Mode to Secondary GPS and the Heading device to HDT Custom XYZ
- All should be set and Viking should now be using the robotic total stations for positioning and heading. Highly recommended to do a verification of correct positions and heading using a stand alone method!

# Chapter 6: Troubleshooting

## 6.1 Troubleshooting

#### HASP Key Not Recognized

Please check the following:

- Check if the USB port is functioning
- If used, check USB Cables and USB Hub
- Execute 'HASP Reinstall' program located in Viking's sub directory in the Windows Start Menu

#### The Position Of The Ship Is Not Visible, Whilst A GPS Is Active

By pressing the Follow Ship icon or the Follow Ship option in the View Menu the Ships position will be kept on screen.

#### The GPS Status Icon Is Red Or Yellow

Probably the minimum GNSS status is selected too high for the current GNSS used.

#### No Windows Controls Such As The Task Bar Are Visible

Viking is likely in full screen mode, this can be toggled using the F11 key or from the Full Screen option in the View Menu.

#### The Entire Display Seems Fully Black Or Very Hard To Read

It could be that Viking is still in night mode, by using the key combo CTRL + N it will switch back to the normal colour scheme.

# Chapter 7: Glossary Of Terms

**AIS** - Automatic Identification System

**COG** - Course Over Ground of a moving object

**DXF** - Drawing eXchange Format, is a CAD file format developed by Autodesk. It is used for interchanging vectorized drawings between software products.

**GLONASS** - GLObal Navigation Satellite System, the Russian navigational satellite network.

**GNSS** - Global Navigation Satellite System. Used to refer to any sort of Satellite navigation. Including GPS, GLONASS and Galileo.

**GPS** - Global Positioning System. Used as a general term, but officially refers to the Navstar network of the United States of America's government.

**HDG** - Abbreviation for Heading of a moving object

**PoE** - Power over Ethernet

**RS232** - In telecommunications, RS-232 (Recommended Standard 232) is a standard for serial binary data signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports

**SOG** - Speed Over Ground of a moving object

**TCP/IP** - Transmission Control Protocol / Internet Protocol. The Internet Protocol Suite is the set of communications protocols used for the Internet and local networks.

**USB** - Universal Serial Bus, a hardware standard used all over the IT industry. Used for connecting all sorts of peripherals. A five volt power is also incorporated into the USB interface.

**UHF** - Ultra High Frequency wireless long range telemetry system

**VCT** - Viking Chart file format. Used by Viking to store it's vectorized chart in binary form.

**VMA** - Viking Matrix file format. Used by Viking to store 3D DTM matrix data.

**VTK** - Viking Track file format. Used to store the tracked locations of the vessel in a binary file format.

# Chapter 8: User Manual Revision History

| | | |
|---|---|---|
| Version 1.0 | 08 April 2020 | Initial release after merging and evolving from previous products; Portable TMS and Rapid Response System |
| Version 1.1 | 06 September 2022 | Modified TCP setting of WZN model, added channel detail.<br>UHF Serial only for SHM model notes.<br>Added notes for WZN UHF config method.<br>Added Viking networking output config. |

# Alphabetical Index