



Underway Profiling winch

Installation & Operation manual

C-MAX Ltd.

www.cmaxsonar.com

www.vigowinch.com

Table of contents

- [1. Introduction](#)
- [2. Summary of Warnings](#)
- [3. Installation](#)
 - [3.1 Location](#)
 - [3.2 Extending and Retracting the Boom](#)
 - [3.3 Fitting the line to the level-wind](#)
 - [3.4 The Line-Limit Tube](#)
 - [Removing and replacing the line-limit tube](#)
 - [3.5 Power Supply](#)
 - [3.6 Network](#)
 - [3.7 Integration into the Survey Network](#)
 - [3.8 Interfacing with Valeport profilers](#)
 - [3.8.1 Configuring Valeport Connect](#)
 - [3.9 Interfacing with AML profilers](#)
 - [3.9.1 Configuring AML Sailfish](#)
 - [3.9.2 Configuring Vigo Depth Relay](#)
- [4. Getting Started](#)
 - [4.1 Powering the Winch](#)
 - [4.2 Using the IN and OUT Controls](#)
 - [4.3 Accessing and Navigating the Control Software](#)
 - [4.4 Configuring and Attaching the Profiler](#)
 - [4.5 Setting the Data Transfer Position](#)
- [5. Profiling](#)
 - [5.1 Selecting a different profiler](#)
 - [5.2 Changing the Profiling Mode](#)
 - [5.3 Changing the Recovery Speed](#)
 - [5.4 Setting the Power Budget](#)
 - [5.5 Acquiring a Profile](#)
 - [Using automatic coverage mode](#)
 - [5.6 Repeating a Profile](#)
 - [Repeat Cast on New SWiFT Message](#)
 - [Repeat Cast after 'x' minute\(s\)](#)
 - [Repeat Cast every 'x' meters](#)
- [6. Action if Power Lost](#)
- [7. Action if the Profiler becomes caught](#)
- [8. Routine Maintenance](#)
- [9. Storage and Transport](#)

[10. Specifications](#)

[11. Warranty](#)

[11.1 Scope](#)

[11.2 Limitations](#)

[11.3 Fault Reporting](#)

[11.4 Returns](#)

[11.5 Transferability](#)

1. Introduction

The Vigo profiling winch (hereafter referred to as 'the winch') simplifies the task of repeatedly deploying a sound velocity profiler or other instrument (hereafter referred to for simplicity as 'the profiler'), either from a moving or stationary vessel, eliminating the need for an operator to manually collect profiles from the rear deck. It can also be configured for use from unmanned surface vessels (USV's).

The system is designed to operate primarily with a Valeport SWiFT SVP, with an option to use a Rapid SV profiler for deeper water work. Both these profilers feature Bluetooth® data transmission, allowing automatic retrieval of the recorded profile.

The winch control software allows profiles to be collected manually, when required, or automatically based on distance or time interval. It is a self-contained system, requiring only single phase 230v power, and a wired ethernet connection to operate.

The winch incorporates several features designed to make its installation easier and its operation simpler and more reliable. These features include:-

- a) Integrated control and operation software that runs on the winch and is accessed through a web browser.
- b) Built-in GPS receiver.
- c) A boom carrying the line sheave that can be extended over the stern for deployment of the profiler, or retracted for access to the sheave and profiler on completion of the series of casts; no swivelling platform is needed.
- d) A line-limit tube and switch mechanism to alert the operating software that the profiler is very close to the line sheave.
- e) Audible and visual warnings prior to any automatic movement of the winch.

2. Summary of Warnings

The warnings summarised below are intended to prevent injury to personnel and damage to equipment in what can be a hazardous environment.

OPERATORS OF THIS EQUIPMENT ARE RESPONSIBLE FOR THEIR OWN SAFETY

THE SUPPLIER ACCEPTS NO LIABILITY FOR THE CONSEQUENCES OF EQUIPMENT USE OVER WHICH IT HAS NO CONTROL

ALWAYS OPERATE THE WINCH WITH THE SPOOL GUARD IN PLACE

ALWAYS OPERATE THE WINCH WITH THE LINE-LIMIT TUBE IN PLACE

BE AWARE THAT THE LINE CAN ACT ABRASIVELY AT HIGH SPEED

AVOID PLACING EXCESSIVE SIDEWAYS FORCE ON THE BOOM

ASSUME THAT THE WINCH MAY OPERATE AT ANY TIME WHEN IT IS POWERED ON

DO NOT STAND ON THE LINE OR STAND INSIDE LOOPS OF LINE THAT MAY BE LYING ON DECK. DO NOT WRAP THE LINE AROUND YOUR HANDS

ENSURE THE EMERGENCY CRANK HANDLE IS ALWAYS AVAILABLE ON BOARD THE VESSEL

3. Installation

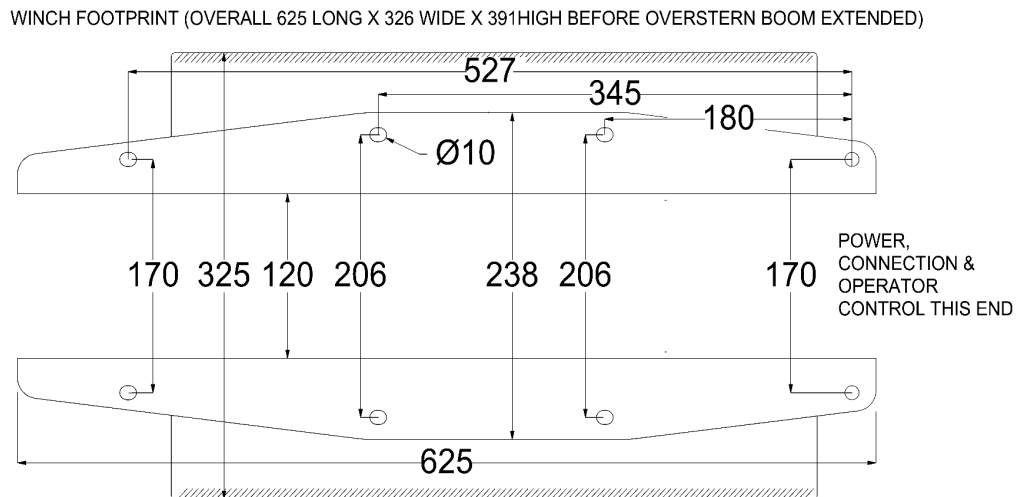
3.1 Location

The winch should be mounted at a location which allows the boom to be extended over the stern, far enough from the vessel outline that the profiler is unlikely to contact the hull.

Apart from its location the height of the mounting platform should be such that when the profiler has been fully recovered it will be suspended clear, or partially clear, of the water and in a position where it can reliably transmit data.

If a raised platform is needed this can be a simple structure. The boom should be parallel to the boat's centreline so that it will experience minimum sideways force when the profiler is deployed and the boat is underway.

The winch is supplied with eight points at which attachment screws can be fitted. However it can be secured with as few as four screws if necessary, leaving four of the holes empty.



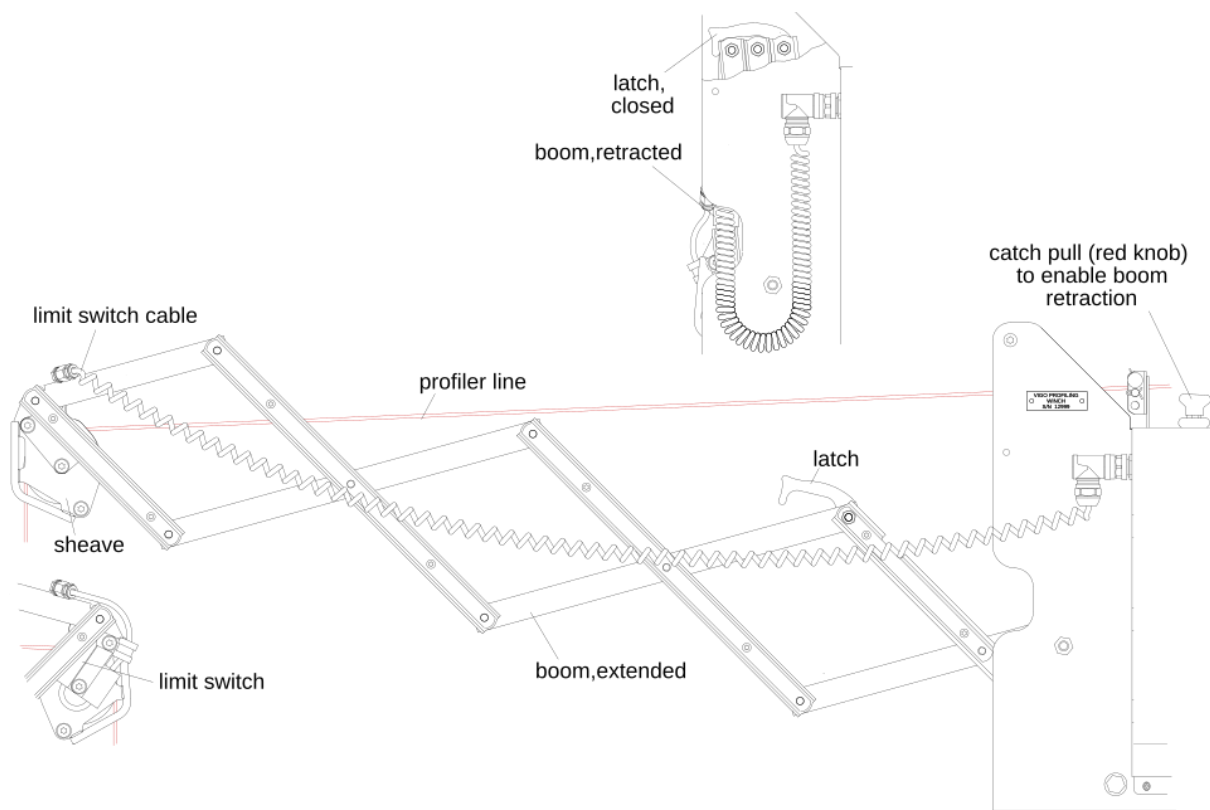
The mounting footprint

3.2 Extending and Retracting the Boom

The winch is supplied originally with the boom in the retracted position; a configuration that it will usually be returned to when not in use.

To extend the boom, release the red latch. This latch pivots on one of the top hinges of the boom, and when closed, extends outwards to grip one of the other hinges. With the latch lifted pull the end of the boom outwards until it locks in position. The mechanism that locks the boom reports the fact to the winch computer which, if powered, switches on the two white LED's that illuminate the boom area. This extended position is necessary (in a normal installation) before the computer will allow casts to be performed, and is confirmed to the operator via the control software.

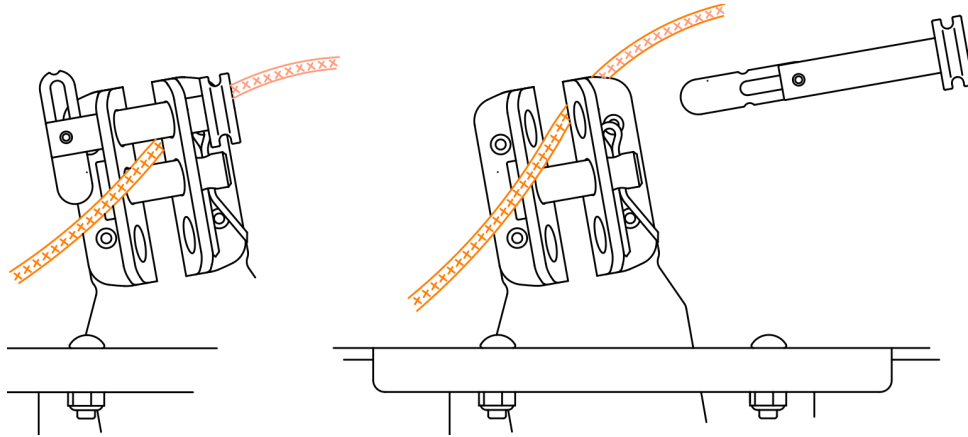
To retract the boom from the fully extended position, lift the red knob on the levelwind unit. Whilst this knob is held raised the boom lock is released and the boom can be retracted. Ensure that the rotating red latch is above the path of the retracting boom then push the boom back fully towards the winch. When the boom is fully retracted rotate the latch down to secure it.



The deployment boom

3.3 Fitting the line to the level-wind

As supplied from the factory, the line is installed into the level-wind wiper arm between the clevis pin and the removable drop-nose pin, as shown in the illustration below. Should the line need to be re-fitted it is a simple matter to remove the drop-nose pin, threading the line between the guides and refitting the pin. Ensure that the toggle on the end of the drop-nose pin is closed fully.



Fitting the line to the level-wind

3.4 The Line-Limit Tube

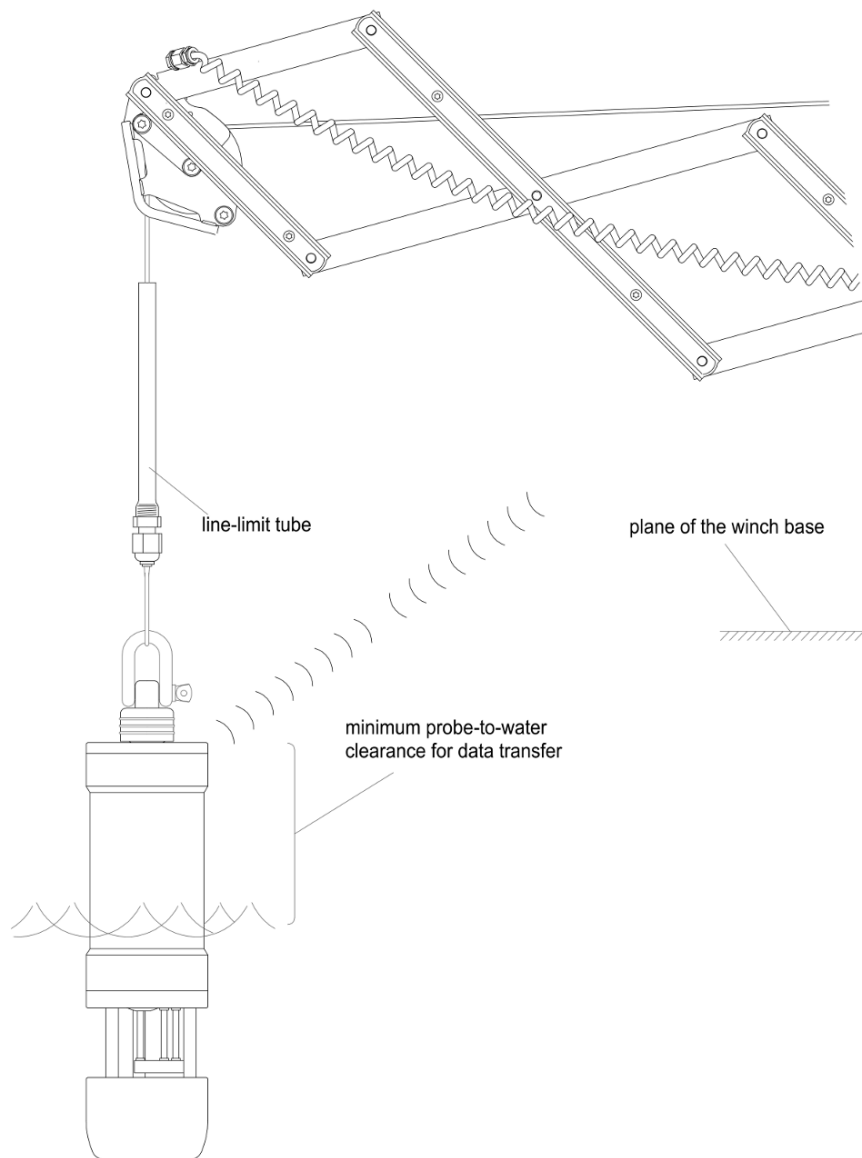
The winch is supplied with a line-limit tube fitted to the line. This item is vital for the correct operation of the winch.

The sheave assembly mounted at the end of the extending boom incorporates both the main pulley and, above the line, a smaller wheel. This upper wheel detects when the line-limit tube enters the sheave assembly and triggers a switch which has two functions, as follows:-

1. It tells the winch to stop pulling the line in, preventing the profiler from impacting the sheave assembly
2. When performing the pre-launch configuration it enables the winch to position the profiler automatically a certain distance from the sheave assembly (see [section 4.5](#)).

The line-limit tube consists primarily of a flexible tube, one that engages with the upper wheel to rotate it but without applying excessive force to the sheave assembly. In normal operation, because the recovered line cannot stop instantly, the tube is carried a little distance through the sheave assembly.

The tube is fitted to the line immediately above the line's suspension loop, the loop that carries the profiler's attachment shackle. In this position it typically stops the line recovery with the shackle 65mm above the plane of the winch's mounting platform. If the boat's freeboard is such that this does not allow reliable communications then the platform may need to be raised, as already mentioned.



The line-limit tube

Removing and replacing the line-limit tube

It is strongly recommended that only genuine C-MAX line-limit tubes are used. Silicone tube is available in various diameters, thicknesses and grades, and a repair or a substitute may not work as intended. An unreliable limiting action could result in equipment damage.

To remove the tube, first slacken the gland nut and extract the tapered grommet which it has been gripping. Pull the grommet off the end of the line past the suspension loop in the line where the shackle is normally attached. Follow this by removing the gland and tube via the same route.

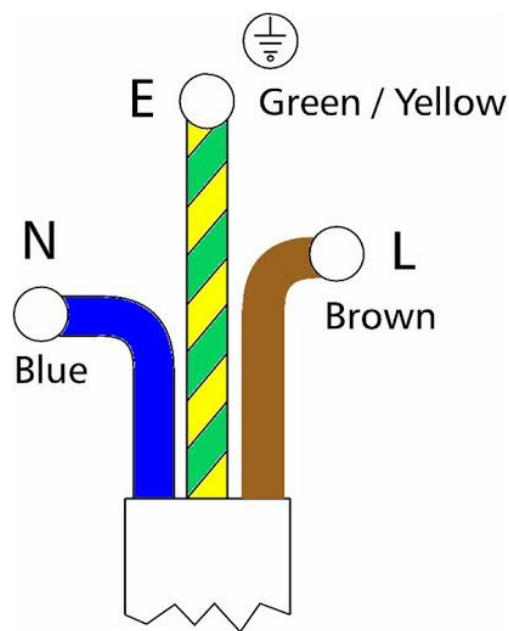
Fitting the replacement tube is the reverse of the removal process. With the new tube in place over the line follow that with the tapered grommet, tapered end first. Getting the grommet over the suspension loop can be made easier by passing a light line (eg. cotton thread) through the grommet, through the line's loop then back through the grommet: this enables the bulky loop to be pulled through the grommet.

With the grommet just clear of the line's loop advance the tube's gland over it and tighten. Whilst tightening the gland continue to press the grommet into it.

3.5 Power Supply

The winch is supplied with a 10m power cable. The power cable should be routed safely to a suitable 230v single phase source and terminated either directly into a switched disconnect or in a suitable plug. The cable should be protected with a 6 amp fuse or circuit breaker. For operator safety ensure that all applicable requirements for neutral-earth bonding have been followed when installing the power cable.

The power connector on the winch has a bayonet locking ring which should be fully rotated to lock the connector into place and to ensure a watertight seal. Avoid forceful insertion of the power connector into the receptacle; this can easily damage the plastic bayonet latches on the locking ring.

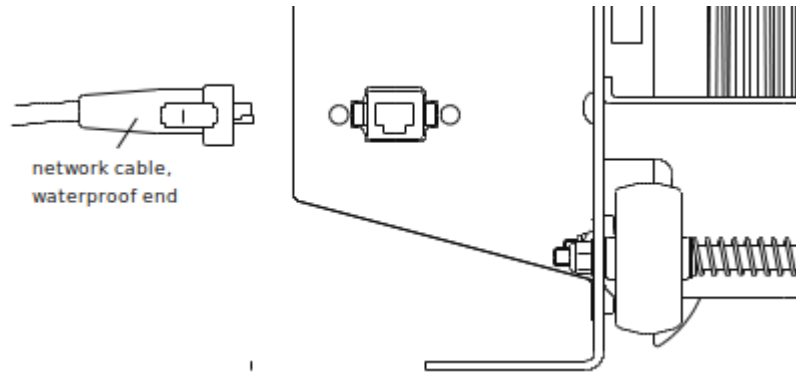


Conductor colours used in the supplied power cable

The winch will monitor the voltage of the AC supply every second to ensure it is within the range **200-255v**. If the supply exceeds these values, a warning will be displayed to the user. If this warning appears, the user should power down the system and rectify the voltage supply issue before restarting the system.

3.6 Network

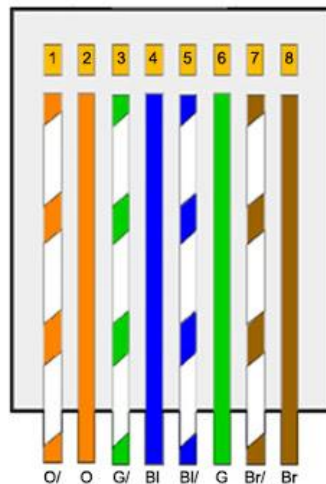
The winch is controlled through a web application and to facilitate this a connection to the survey network is required. A 10m ethernet cable is supplied with the winch as standard. The cable has a waterproof RJ45 connector on one end that locks onto the corresponding LAN connection on the left-hand cover of the winch.



Connecting the waterproof RJ45 connector

The ethernet cable should be routed safely to a suitable network switch in the survey room.

NOTE: If the cable needs to be passed through a gland or bulkhead penetration, the dry end RJ45 connector can be removed and subsequently replaced with a standard RJ45 crimp connector using the EIA-568B wiring colours:



568B

RJ45 wiring to the EIA-568B standard

Do not remove the waterproof RJ45 connector from the cable under any circumstances.

The winch is configured to use DHCP by default and will obtain an address automatically if a DHCP server is present on the network. In the absence of a DHCP response, it will fall back to the static address of **192.168.0.10**

This static address is not easily adjusted by the user¹ so if a DHCP server is not running on the network, the address range of the survey network should be set to match the **192.168.0.X** range.

If a DNS server is present on the network, a DNS entry will be registered, the hostname being '**vigo**'.

3.7 Integration into the Survey Network

A typical survey network that is present on a vessel will usually comprise the following components, connected together by an ethernet switch :-

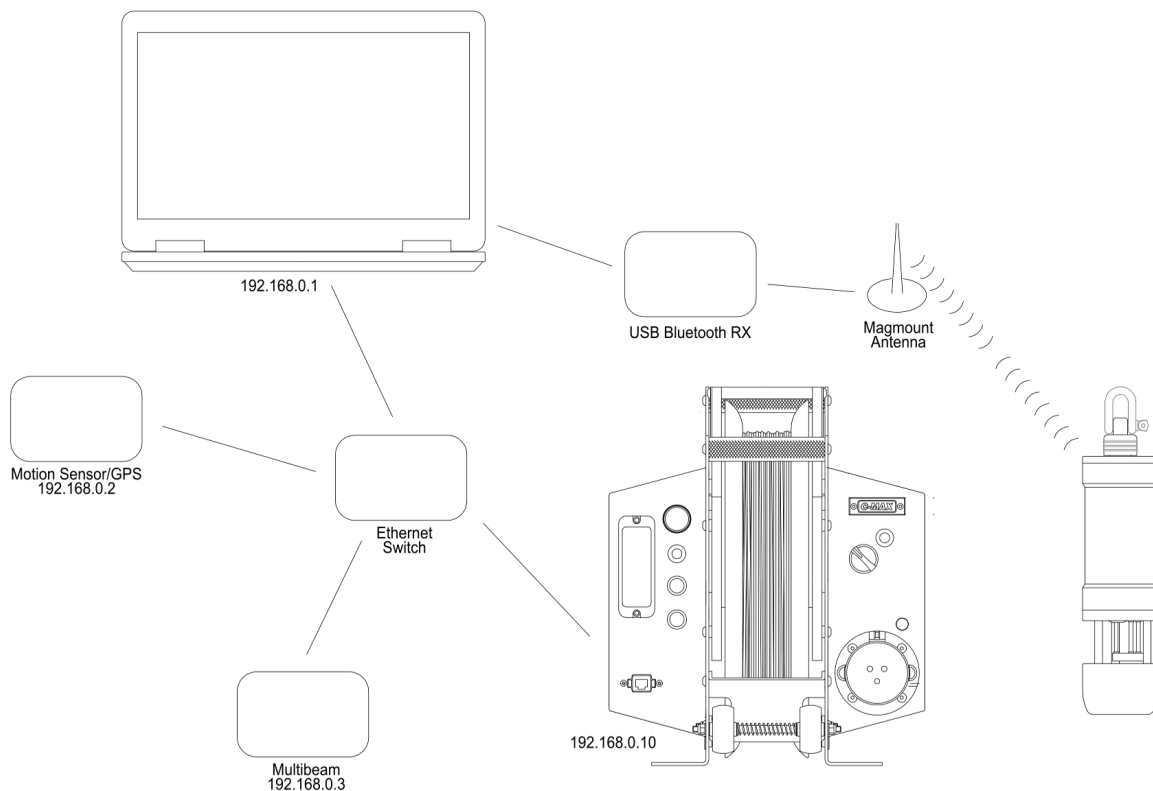
1. Multibeam sonar
2. Motion sensor
3. GPS receiver
4. Survey computer

To complete the integration into this existing setup, the winch requires a connection to the ethernet switch and the survey computer requires the addition of a USB Bluetooth or WiFi receiver and, in the case of certain profilers, the installation of C-MAX's Vigo Depth Relay software.

This receiver provides the connection to the Sound Velocity Profiler and in conjunction with software from the profiler manufacturer, enables automatic retrieval of the recorded profile.

¹ Please contact C-MAX for details if this address needs to be changed

The diagram below shows a typical configuration:



A typical equipment configuration

The winch operating software uses the UDP protocol to receive information/messages from third party software and an echo sounder. To facilitate this, two ports are opened by the winch, bound to the broadcast address (**x.x.x.255**) :-

Port **8090** - receives data from Valeport Connect/Valeport Ocean or C-MAX's Vigo Depth Relay software.

Port **8091** - receives depth messages from a network connected echo sounder or navigation system.

Valid depth messages are: **\$DBT**, **\$DBK**, **\$DBS**, & **\$DPT**. There is no requirement to specify which message to use; depth information will be extracted from any messages as they are received.

With these ports being bound to the broadcast address, there is no requirement to specify the IP address of the winch either in Valeport Connect/Ocean, C-MAX's Vigo Depth Relay or in the echo sounder/navigation system configuration.

If the echo sounder/navigation system configuration requires a destination IP address to be specified, then enter the broadcast address for your network, **x.x.x.255**.

3.8 Interfacing with Valeport profilers

When profiling with a SWiFT or Rapid profiler, data can be downloaded into Valeport's Connect software automatically when the profiler surfaces after each cast. The Connect software runs under Windows and should be installed on a PC that is connected to the survey network.

It is recommended that this PC be equipped with an external Bluetooth receiver and magnetic mount antenna, part number **0660EA3**, supplied by Valeport Ltd. to improve the performance of the Bluetooth link. This module and antenna replaces the receiver usually supplied with the SWiFT or Rapid profilers.

The module is supplied with a 10m antenna that would typically be positioned near the stern of the vessel. On smaller vessels or autonomous platforms, this antenna can be positioned on the main antenna platform, typically in the centre of the vessel, and well above the waterline.

The profiler will need to be paired to the Bluetooth module before use, using the Valeport Bluetooth Configurator utility available from <http://www.valeport.download>

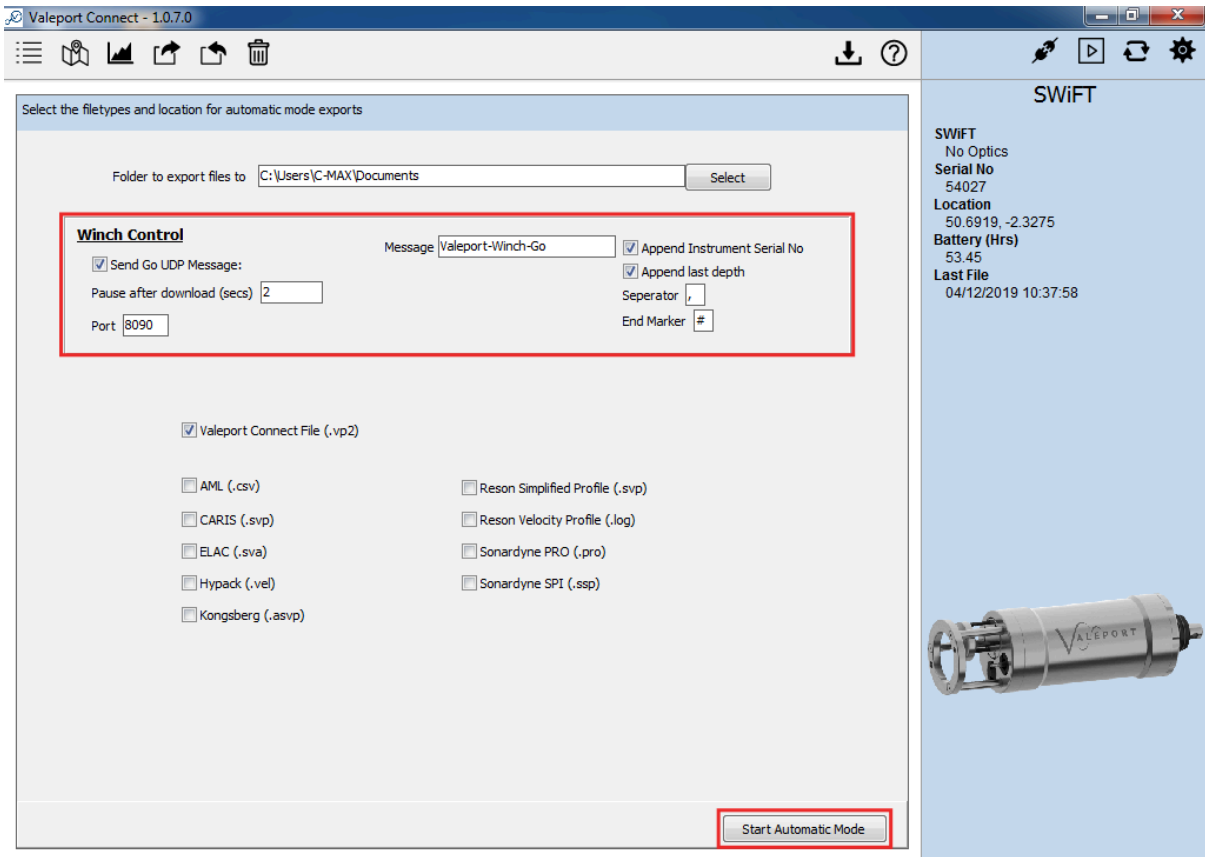
Pairing the profiler to this module will remove the pairing to the original receiver. If the profiler is to be used with either the original receiver, or on another vessel equipped with an external module, the pairing procedure will need to be completed again.

3.8.1 Configuring Valeport Connect

Connect version **1.0.7.0** is required: this can be downloaded from <http://www.valeport.download>

It is advisable to set the profiler into automatic mode. This will cause Connect to broadcast a message via the UDP broadcast address when the latest profile has downloaded. Please review the **Connect Software Operating Manual**, document 8500800b, available from the Valeport Download site.

When configuring Connect to work in automatic mode, it should be set to enable the broadcast of the **'Winch Go message'**. The **'Pause after download'** option should be changed from the default **60s** to **2s**, all other settings can be left as the default.



Configuring Valeport Connect to operate in automatic mode

It may be necessary to allow Connect to access the network through the Windows Firewall. In this case, a popup message will appear when Connect tries to send the first message.

3.8.2 Valeport Ocean software

Since the initial release of this operation manual, Connect has been superseded by Ocean. This new software package works in a similar way and all configuration options are in the same location. It is available for download from www.valeport.download

C-MAX recommends the use of Ocean in all cases where a SWiFT profiler is used. Users of the rapidPro profilers should continue to use Connect until advised otherwise by Valeport.

3.9 Interfacing with AML profilers

The Vigo can be used with either the AML3 or AML6 profilers, in the '-LGR' variant. These profilers connect to the survey computer using WiFi and download their data automatically on completion of a profile.

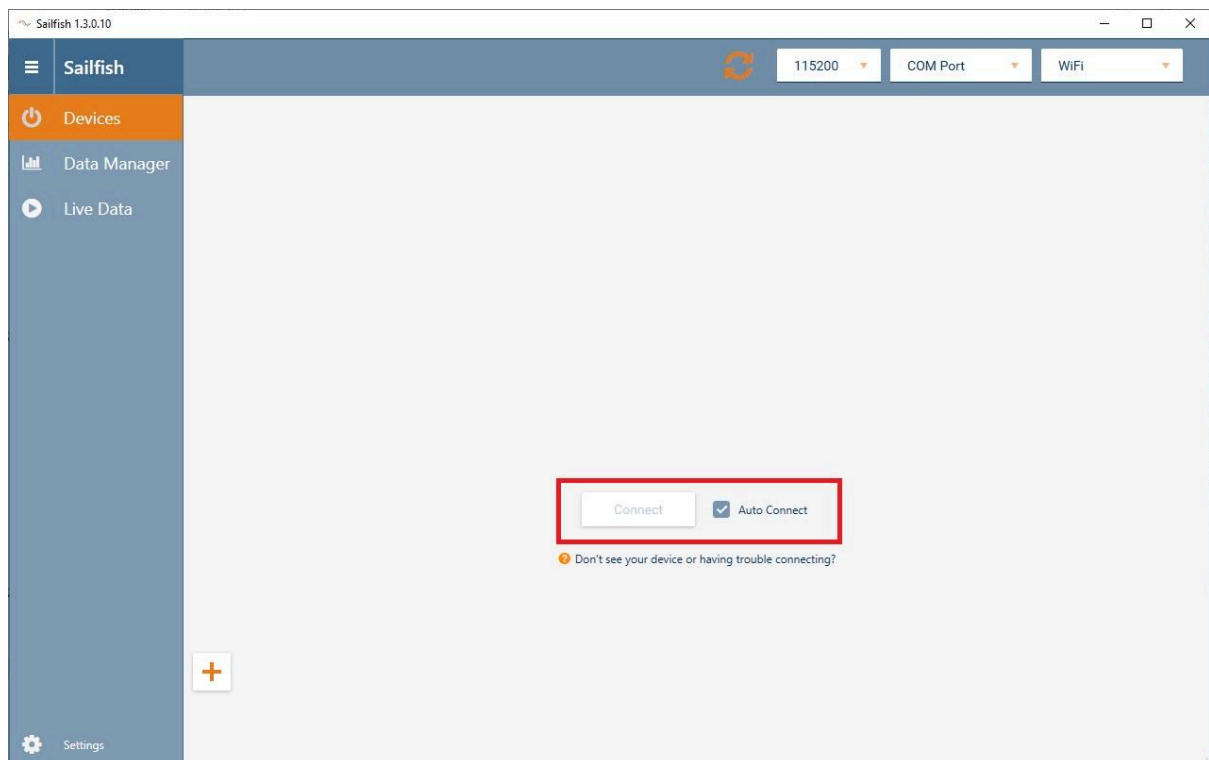
AML Sailfish software does not have the functionality to send the depth of the profile to the Vigo, so an additional software utility is used to enable this feedback loop.

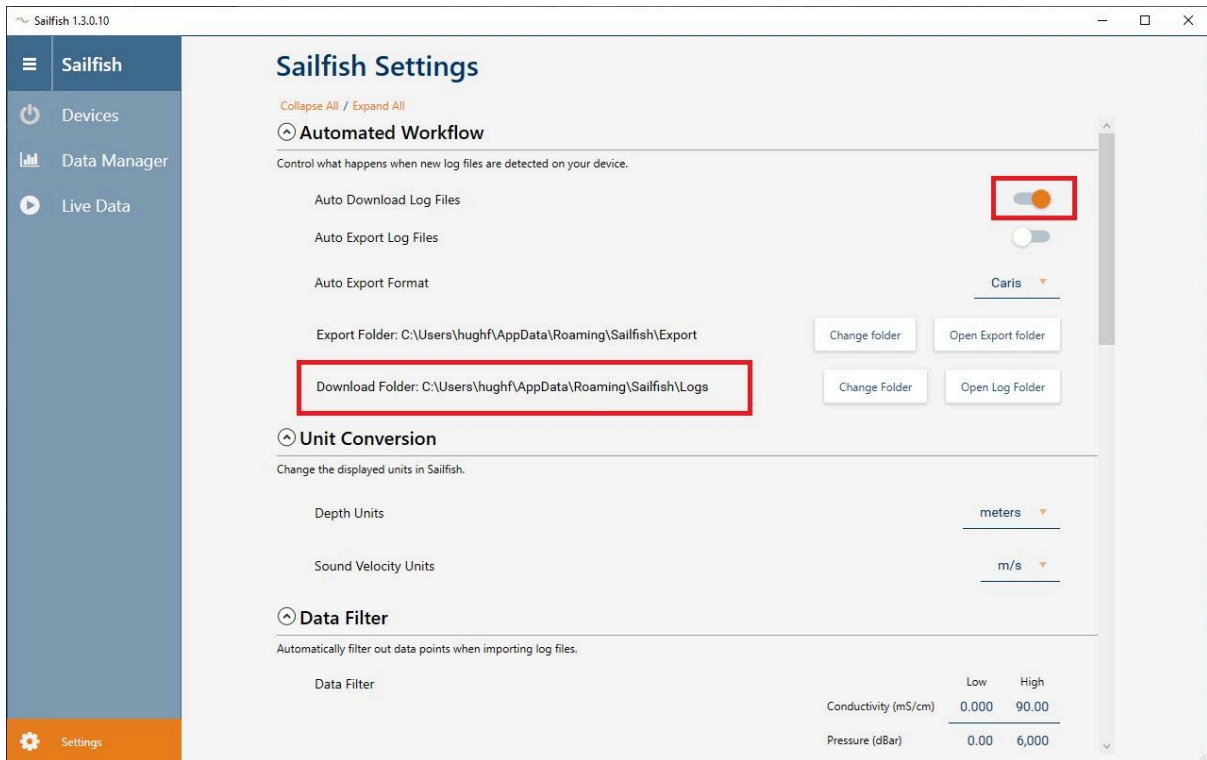
C-MAX's Vigo Depth Relay software is run on the same PC as Sailfish and performs the following functions:

1. Watch a folder for new profile files downloaded by Sailfish from the profiler.
2. Parse the file and extract the maximum depth value from the data.
3. Send this information in the correct format over the network to the Vigo.

3.9.1 Configuring AML Sailfish

AML's Sailfish software should be configured to automatically connect to a detected profiler and automatically download log files. The operator should take a note of the '**download folder**' location as this will be required when configuring the Vigo Depth Relay software in the next step.





Configuring AML Sailfish software to operate in automatic mode

3.9.2 Configuring Vigo Depth Relay

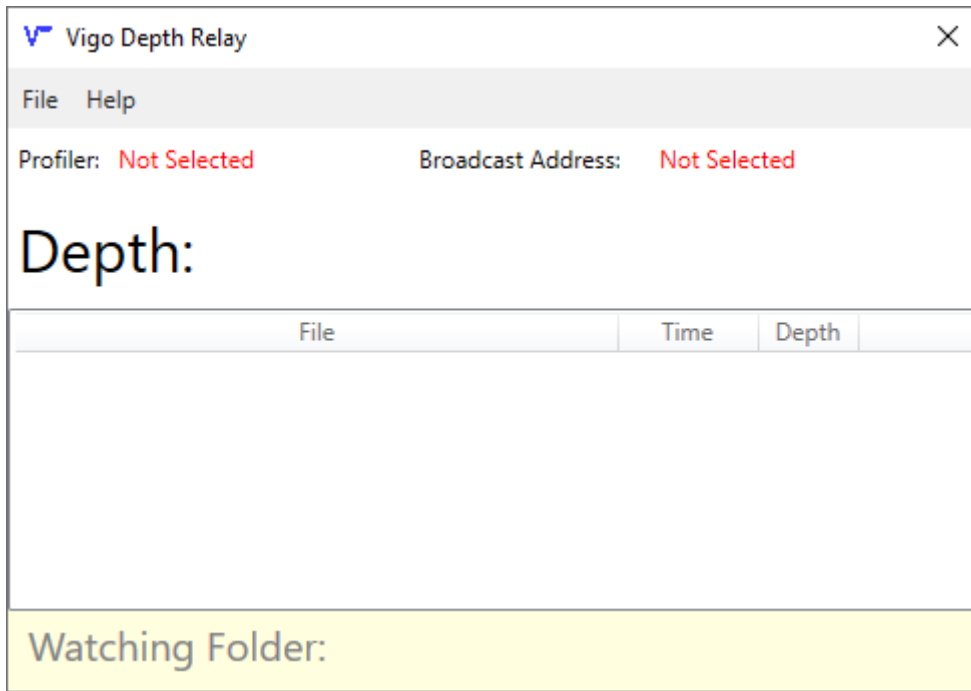
Vigo Depth Relay is supplied as a self contained executable file² requiring the Microsoft .NET runtime version 5.0 to run. It monitors a specified folder for new files, extracts the depth and broadcasts this over the survey network in the same manner as Valeport Connect.

Vigo Depth Relay can be used with either AML profilers or older Valeport profilers that do not work with the latest version of Connect.

Three settings need to be configured before use:

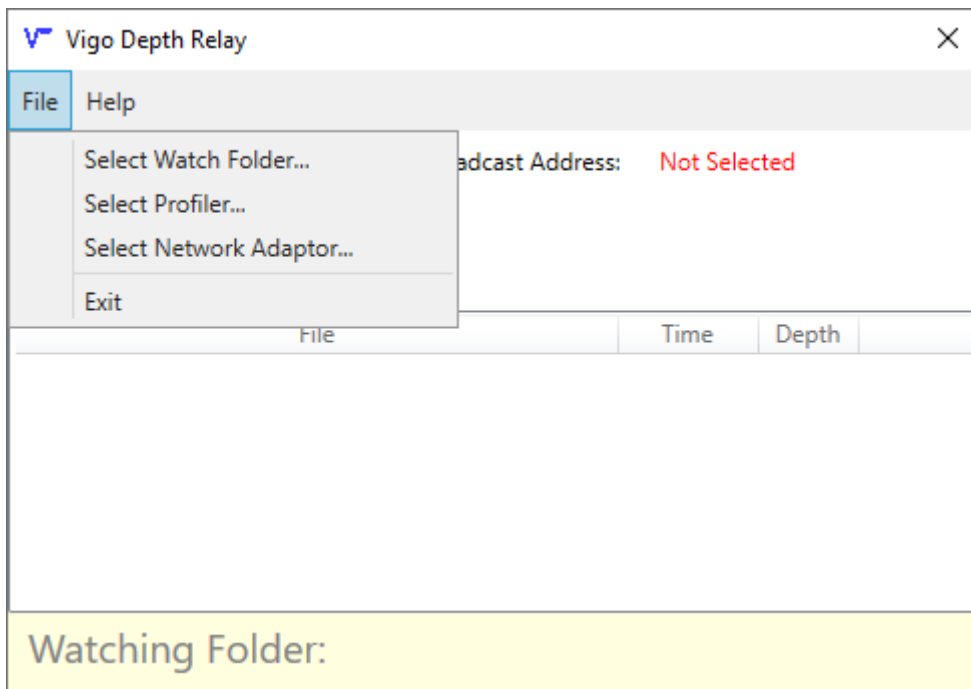
1. The type of profiler being used
2. The folder to watch for new files
3. The network adapter to use to connect to the survey network

² Please contact C-MAX for download details



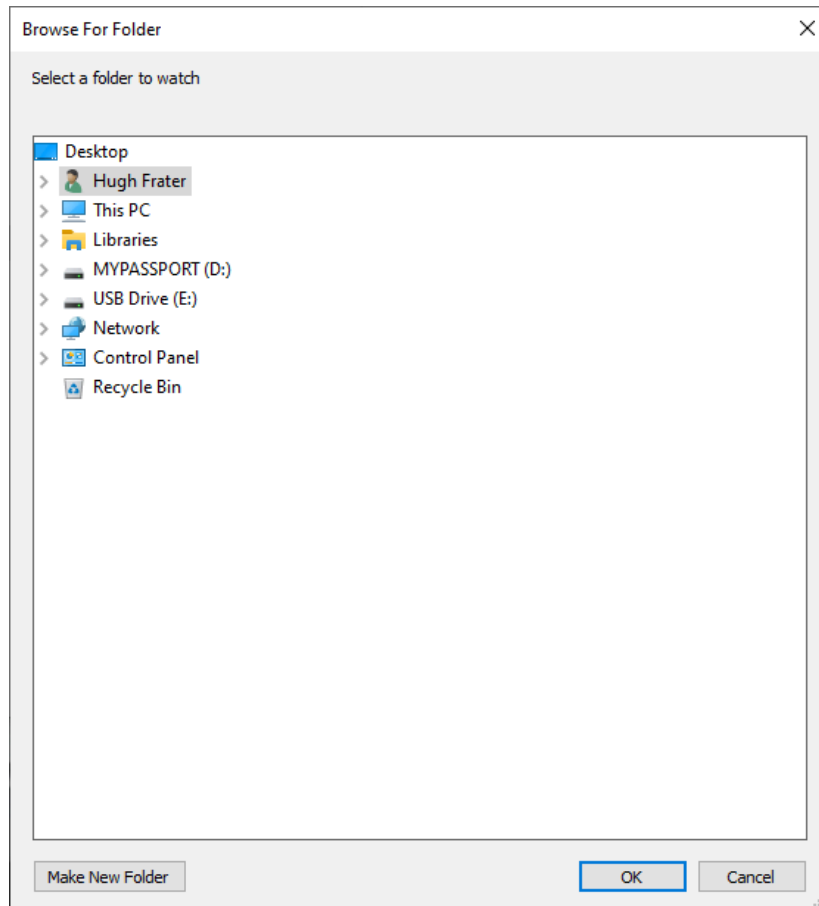
Vigo Depth Relay when first loaded

The settings are changed by accessing the 'File' menu as shown below.



Accessing the file menu to configure the settings

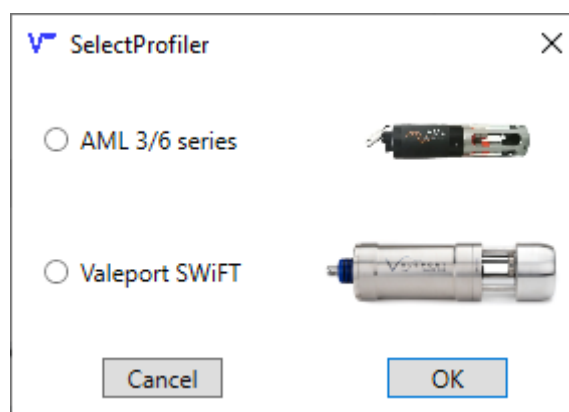
Begin by selecting the 'Watch Folder'. This is the folder on the computer where new log files are saved when downloaded automatically from the profiler.



Selecting a folder to watch for new files

With the **watch folder** selected, the display will now show the name of this folder in the lower part of the window. Hovering the mouse over this will show a tooltip with the full path to the folder. Check that this matches the download folder that was configured in Sailfish earlier.

Continue by selecting the type of profiler that is being used.

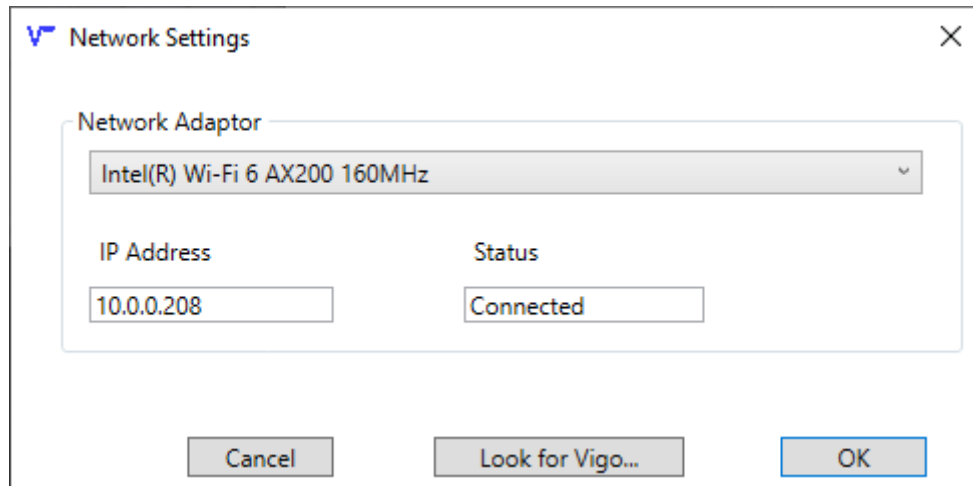


Selecting the profiler

With a profiler selected, Vigo Depth Relay will know which file types to process when they are added automatically to the **watch folder**.

The final setting to configure is the network adapter used to connect this PC to the survey network. This would typically be a wired ethernet connection and it should be on the same logical subnet as the Vigo winch.

There is no need to specify the IP address of the Vigo, all data is sent to the broadcast address.



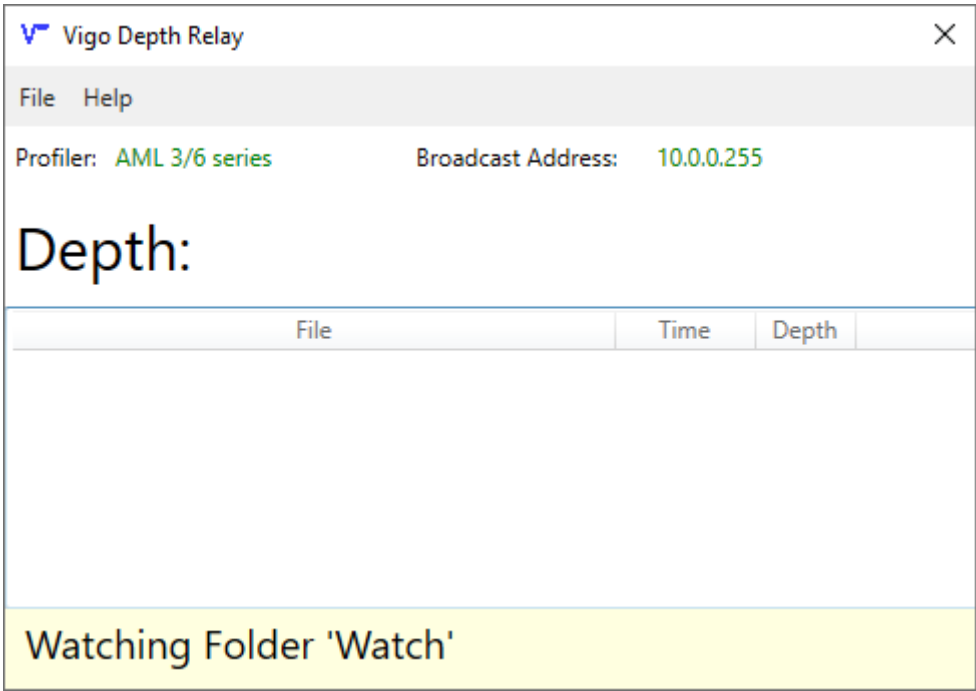
Selecting a network adapter

Vigo Depth Relay will force you to select an adapter that is connected. You should check the IP address field to check that the selected adapter is correct.

Clicking the '**Look for Vigo**' button will send a custom query message to the broadcast address. Any Vigo that is powered on, with its web control panel open will respond to this query³. A dialog will alert the user if a Vigo is found on the network.

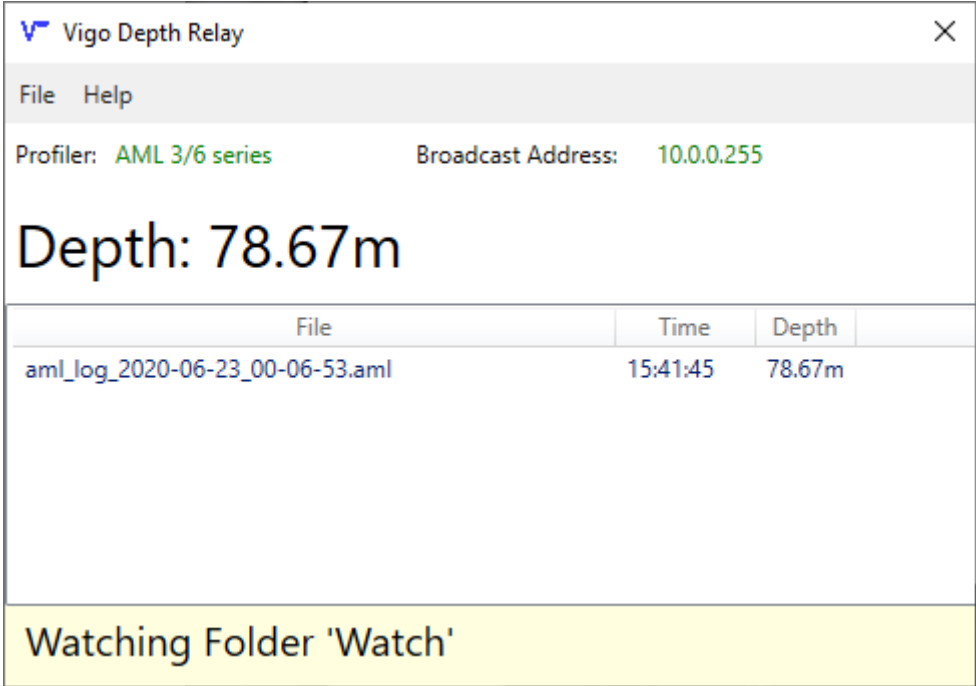
When the three settings have been configured, Vigo Depth Relay will appear as shown below.

³ Vigo operating software version 2021.05.11b or later is required for this functionality to work



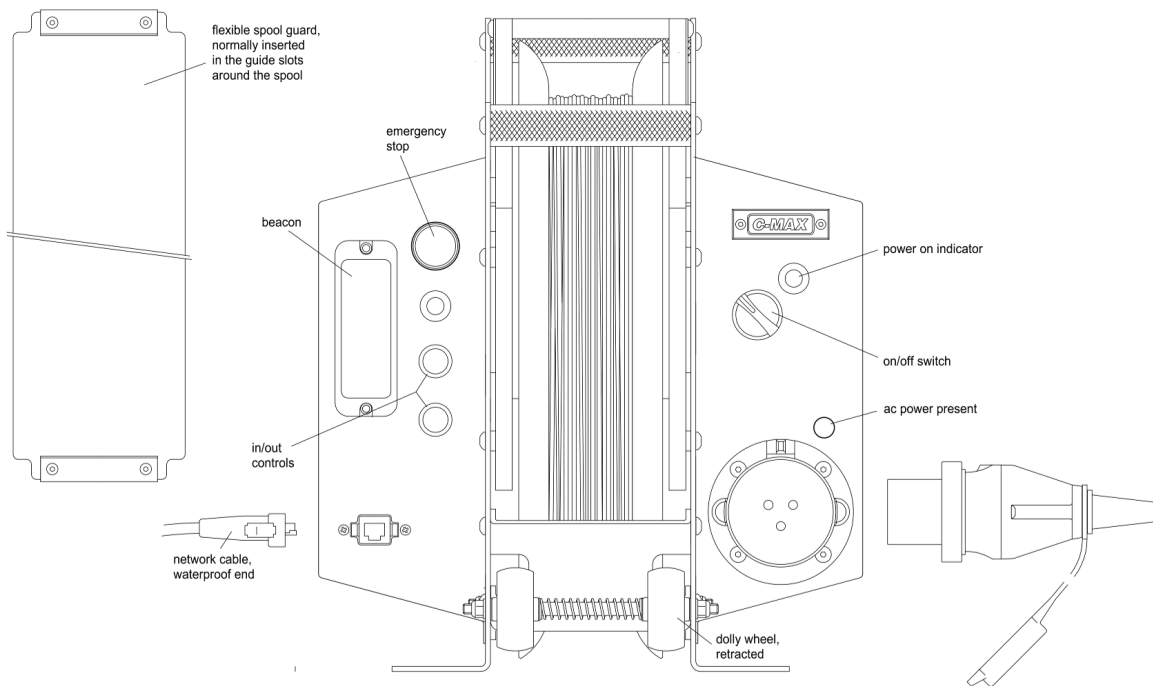
Vigo Depth Relay waiting for a new file

When a file is written into the **watch folder**, Vigo Depth Relay will process the file, extract the depth, update the user interface and broadcast the depth to the Vigo over the network. New files are added to the log, with the newest at the top. The log can be cleared through a right-click context menu.



Processing an AML record from the watch folder

4. Getting Started



The Vigo winch, inboard view

4.1 Powering the Winch

With the winch mounted in a suitable location and the power and ethernet wiring completed, the winch can be powered on. The presence of an AC supply to the winch is confirmed by the neon indicator above the power inlet. This neon will illuminate whenever an AC supply is present, irrespective of the position of the rotary power switch.

Turn the rotary power switch clockwise from **0** to **1**: the red LED indicator to the right of the power switch will illuminate and the winch will begin a startup procedure lasting between 30-45 seconds⁴.

When the startup procedure has completed the winch sounder will emit a short tone, indicating to the user that the system is ready to be used.

4.2 Using the IN and OUT Controls

The IN and OUT buttons on the winch's operator panel allow the operator to control the motion of the spool directly, independently of the network. These are referred to as the 'jog' controls as they are

⁴ The startup procedure will vary with software version and DHCP server response time

usually used to shift the line over only a short distance such as may be needed to set the initial data transfer position (see [section 4.5](#)).

When these controls are being used the speed of the spool's rotation is limited for safety and practicality.

4.3 Accessing and Navigating the Control Software

The control software is accessed by entering the IP address (**192.168.0.10** or other, DHCP assigned address) or hostname (**vigo**) of the winch into a web browser. The software is served on port **10000** and as a result the address should be entered into the address bar in the following format:

http://x.x.x.x:10000 or **http://vigo:10000** if a DNS server is running on the network.

The following page is displayed when the connection to the software is successful:

Vigo
Profiling winch
Server ver: 2020.06.12r
Client ver: 2020.06.16

GPS status
TIME: 11:08:04
LAT: 50.691808
LON: -2.327668
Speed (m/s): 0.0
Water depth (m):

Power info
Volts: 242.3
Watts: 22.9
Power budget: 750w

Cast info
Last cast depth (m):
Scope (m): 0
RPM:
Cast count:
Cast mode: UNDERWAY
Next cast in:

Winch status
E-Stop: GO
Boom lock: LOCKED
Line-limit switch: CONNECTED

Jog control
Jog:
Jog buttons: RELEASED

Settings
Tests
Profile
Plotter

Settings
Set data transfer position Automatically Offset (m)
Set wind-in speed rpm
Set power budget watts
Set profiling mode
Show/Hide debug area

The Vigo web-based control software

The software presents a single page application to the user. The main application window is divided into three main areas :-

1. Status area
2. Jog control
3. Tabbed pane with 4 horizontal tabs

The **Status area** comprises the section of the screen marked 'GPS status', 'Power info', 'Cast info' and 'Winch status'.

GPS status :- this area displays information from the integral GPS receiver and a network connected echo sounder.

Power info :- this area displays the AC line voltage, the realtime power consumption of the winch, and the current power budget.

Cast info :- this area displays information related to the previous, current and any upcoming casts. A description of each text area is given below :-

1. **Depth of last cast (m)** - populated with the value received from Connect, it shows the user the depth that the profiler achieved on the previous cast
2. **Line out (m)** - shows the calculated amount of line that is deployed into the water at any time. This value is calculated based on the value of the motor encoder and as a result may display negative values if the line is jogged in after the data transfer point has been set (see [section 4.5](#) for more information). The calculation may be affected by the way the line has laid onto the spool during casts and as such should be treated as an approximation.
3. **RPM** - populated with the motor speed during the pay-out and wind-in phases of the cast
4. **Cast Count** - shows the number of casts taken during this session
5. **Cast mode** - shows the user the current cast mode (see [section 5.1](#))
6. **Next cast in** - counts down in meters or minutes/seconds when repeat casting is enabled (see [section 5.5](#))

Winch status :- this area displays information related to the Emergency stop switch, the boom lock switch and the line-limit switch. If the Emergency stop switch is pressed, the boom is not fully extended and locked, or the line-limit switch is not connected, the text will change in both description and colour to indicate this to the user.

The **Jog control** area contains 2 buttons that replicate the behaviour of the physical IN and OUT controls. Like the physical controls, these are inactive after the winch has started running casts. These buttons will move the line in or out by a pre-programmed amount for each mouse click.

The lower section of the screen is a **tabbed pane** area with four horizontal tabs :-

1. **Settings** - Controls on this tab allow the user to configure various parameters prior to acquiring a profile
2. **Tests** - Controls on this tab allow the user to test various outputs from the control system, for example the beacon or levelwind motor.
3. **Profile** - Controls on this tab allow the user to acquire a profile, specifying the depth and required repeat options (optional)
4. **Plotter** - This tab displays a simple plotter that shows the position of the vessel in relation to previous casts.

The software relies on JavaScript being enabled in the web browser. All modern browsers are supported on Windows, MacOS or Linux. It is recommended that the computer has a minimum screen resolution of **1366x768**.

4.4 Configuring and Attaching the Profiler

Refer to the operating instructions for Valeport Connect to configure the profiler for the required cast type (upcast/downcast) and required sample steps.

As described in [section 3.8](#), the profiler should be configured to operate in automatic mode.

When the winch is initially powered up, the manual IN and OUT controls are active by default. Use these 'jog' controls to wind enough line off the winch to have safe and easy access to the loop termination.

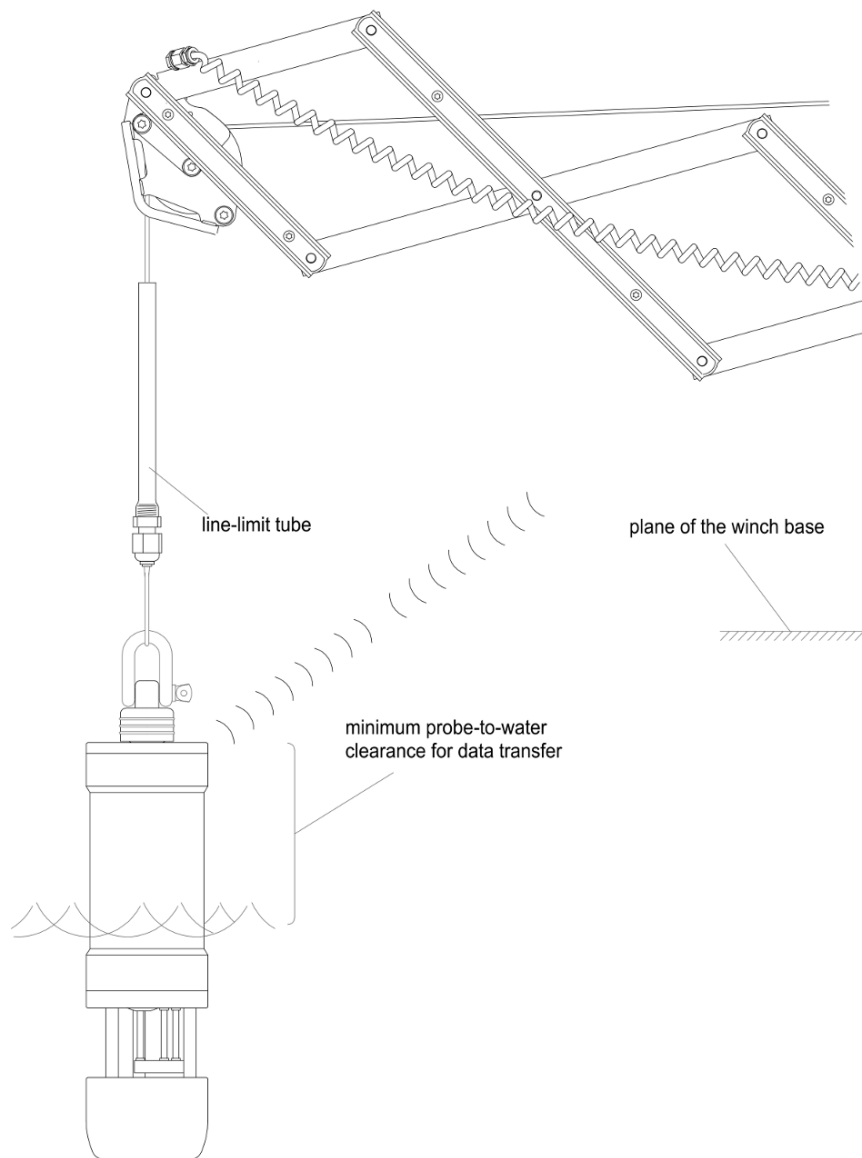
The profiler should be attached to this loop termination using a suitable shackle.

WARNING: *Ensure the shackle is tightened firmly. The use of a cable-tie or seizing wire is recommended to ensure the shackle cannot work loose in operation*

4.5 Setting the Data Transfer Position

To enable reliable data transfer from the attached profiler, and before any casts can be performed, the user must set the position where they wish the profiler to be recovered to when the cast is completed. This position is referred to as the **data transfer position**.

Typically this position would keep the lower half of the profiler in the water, whilst exposing the upper surface to allow data transfer to complete. A benefit of keeping the profiler partially submerged is that forward motion of the vessel will keep the profiler stable.



Positioning the profiler in the water

If the vessel has a large freeboard it may be necessary to recover the profiler completely out of the water to enable reliable data transfer. In this case, some protection should be provided to the stern of the vessel to soften any impact from the profiler.

The data transfer position can be set in two ways :-

1. Manually, by positioning the profiler at the required position using the jog controls.
2. Automatically, with the winch automatically positioning the profiler a given distance away from the sheave assembly.

Manual positioning would typically be used on a manned vessel, where the profiler can be seen by the operator and the jog controls can be used. Automatic positioning would typically be used on autonomous platforms where the winch is required to set the position without a user being present onboard.

To set the data transfer position manually :-

1. Using the jog controls, lower the profiler over the stern of the vessel, to the position that it should be recovered to on completion of the cast
2. From the 'settings' tab of the control software, click 'Set data transfer position'

Setting the data transfer position manually

Setting the data transfer position automatically requires that the line-limit tube is correctly installed. Please refer to [section 3.3](#) to ensure that this is installed correctly.

To set the data transfer position automatically :-

1. Tick the checkbox marked 'automatically'
2. Enter the required offset value. The software will accept values between 0.3 - 5m.
3. Click 'Set data transfer position'

The winch will slowly begin winding in line until the line-limit switch is activated. At this point the motor direction will reverse and the winch will spool out line until the required offset value is reached.

NOTE: *If the line-limit switch is already activated by the presence of the line-limit tube, a warning will be displayed to the user and the action to automatically set the data transfer position will fail.*



Profiling winch

Server ver: 2020.06.12r

Client ver: 2020.06.16

GPS status

TIME: 11:27:47
LAT: 50.691177
LON: -2.326418
Speed (m/s): 0.0
Water depth (m):

Power info

Volts: 241.7
Watts: 22.3
Power budget: 750w

Cast info

Last cast depth (m):
Scope (m): 0
RPM:
Cast count:
Cast mode: UNDERWAY
Next cast in:

Winch status

E-Stop: GO
Boom lock: LOCKED
Line-limit switch: CONNECTED

Jog control

Jog:
Jog buttons: RELEASED

Settings

Set data transfer position Automatically Offset (m)

Set wind-in speed rpm

Set power budget watts

Set profiling mode

Show/Hide debug area

Setting the data transfer position automatically

A warning is displayed if the offset value is out of bounds and the operation will fail. A correct value should be entered and the operation repeated.



Profiling winch

Server ver: 2020.06.12r

Client ver: 2020.06.16

GPS status

TIME: 11:35:42
LAT: 50.691967
LON: -2.327258
Speed (m/s): 0.0
Water depth (m):

Power info

Volts: 242.8
Watts: 22.5
Power budget: 750w

Cast info

Last cast depth (m):
Scope (m): 0
RPM:
Cast count:
Cast mode: UNDERWAY
Next cast in:

Winch status

E-Stop: GO
Boom lock: LOCKED
Line-limit switch: CONNECTED

Jog control

Jog:
Jog buttons: RELEASED

Settings

Set data transfer position Automatically Offset (m)

Set wind-in speed rpm

Set power budget watts

Set profiling mode

Show/Hide debug area

WARNING

Offset out of bounds, please enter a value between 0.5 & 5

OK

Warning displayed when offset is out of bounds

5. Profiling

Four parameters can be configured prior to running a profile. These are accessed from the 'settings' tab :-

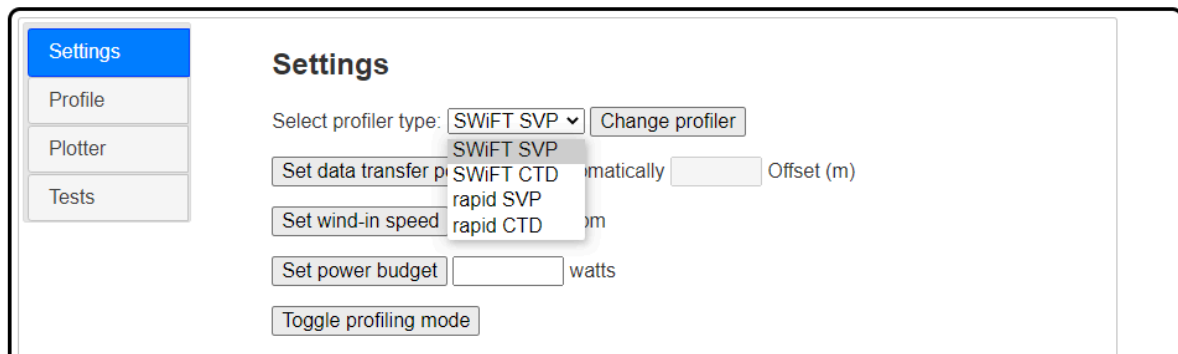
1. Selecting a different profiler
2. Changing the profiling mode
3. Changing the recovery speed
4. Setting the power budget

In normal use, it is anticipated that only the first option, the profiler type, will be routinely changed.

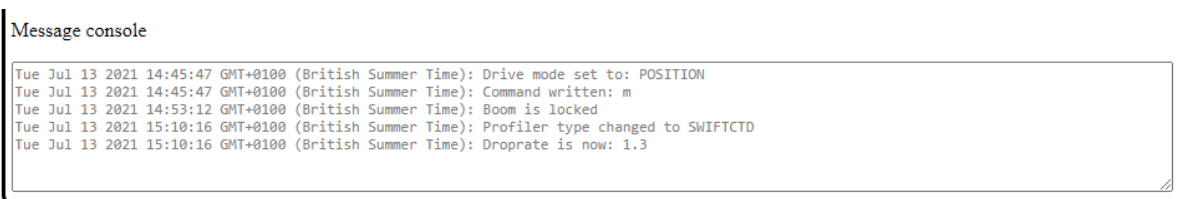
5.1 Selecting a different profiler

The winch is programmed with a selection of drop-rate constants matching a variety of profilers⁵. The default profiler that is selected at startup is the Valeport SWiFT SVP.

To change the profiler, select the required entry from the drop-down and click '**change profiler**'. A message will be displayed in the **message console** informing the user of the change and all subsequent casts will use the new drop-rate.



Changing the profiler type



The new droprate is displayed to the user

If the user needs to reset the drop-rate for the currently selected profiler, to override any adjustment made by the automatic depth tuning (see [section 5.5](#)), navigate back to the settings tab and press '**change profiler**' again, without selecting a new profiler. The drop-rate used in the deployment algorithm will be reset to the default value for the profiler selected.

⁵ Profilers available will vary depending on Vigo software version

5.2 Changing the Profiling Mode

The winch can acquire a profile in two ways, the default '**underway**' mode and the user selectable '**downhole**' mode.

In '**underway**' mode the profiler is allowed to freefall in the water column, pulling the line off the winch as it does so. The rotation of the spool is stopped and the profiler recovered after a given time, calculated to allow the probe to reach the requested depth. This default mode is recommended for all normal profiling tasks, even when the vessel is stationary.

In contrast, '**downhole**' mode uses the motor to power line off the spool at a pre-programmed motor speed of **200rpm**. The rotation of the spool is stopped and the profiler recovered after the control software has measured out the required distance. This mode is recommended for static deployment of an instrument where the speed of descent needs to be accurately controlled.

In both modes, the recovery speed can be adjusted from the default.

5.3 Changing the Recovery Speed

The winch can recover the profiler at a programmable motor speed ranging from 200-1000rpm. The default recovery speed is **350rpm**.

Attempting to enter a value outside of this range will result in a prompt being displayed to the user.

5.4 Setting the Power Budget

If the winch is powered from an AC source that is limited in power, such as an inverter, it may be desirable to limit the maximum power that the winch will use. This can be done by setting the power budget. By default this is set to **750w** but the power budget can be set to any value ranging from 200w-1000w.

Attempting to enter a value outside of this range will result in a prompt being displayed to the user.

The winch will reduce the recovery speed automatically during the recovery of the profiler if the power consumption exceeds the power budget. If this occurs, the sounder will emit a short tone to indicate to the user that the power budget has been exceeded.

If the power budget is regularly exceeded and the winch is repeatedly reducing its recovery speed, the recovery speed should be manually reduced to a more suitable value.

5.5 Acquiring a Profile

With the previous steps completed and any optional parameters set, the winch can be commanded to acquire a profile, hereafter referred to as a 'cast'.

Click on the '**Profile**' tab on the navigation panel; the following page is then displayed :-

The screenshot shows a software interface with a sidebar on the left containing 'Settings', 'Profile', 'Plotter', and 'Tests'. The 'Profile' tab is selected and highlighted in blue. The main content area is titled 'Profile' and contains the following elements:

- A 'Run cast' button followed by a text input field for 'Cast depth (m)'.
- Three unchecked checkboxes:
 - Repeat cast on new SWiFT message
 - Repeat cast after: [input] minute(s)
 - Repeat cast every: [input] meters
- An unchecked checkbox for 'Enable adaptive profiling'.
- A 'Depth factor: [input] % of water column' field.
- An 'Abort cast' button.
- An 'EMERGENCY RECOVER' button.

The profile tab displayed to the user

Enter the required depth of this cast and click '**Run Cast**'. This will initiate the following sequence of events :-

1. The '**Run Cast**' button and depth field will be disabled.
2. The winch will emit a short sound on its internal klaxon to alert anyone near the winch that it will be operating. At the same time, the winch beacon will begin to flash.
3. The winch will release the profiler into the water, to descend through the water column, falling at a known speed.
4. After a pre-calculated time has passed, the winch will stop the rotation of the spool and the profiler's descent. It will then automatically recover the profiler back to the surface, to the data-transfer point.
5. The beacon will be turned off and the brake system will hold the spool to prevent the profiler from descending. This action reduces the power consumption when the winch is idle.
6. The software will initiate a 45 second timeout. During this period it is expecting to receive a message from Connect containing information about the previous cast. When a message has been received, or 45 seconds has elapsed, the software will enable the '**Run Cast**' button and the depth field so that another cast can be taken.

When the control message has been received, the '**Depth**' field in the '**Cast Info**' pane will be populated with the depth that the profiler attained on the previous cast.

NOTE: *When casting in the default underway mode and provided that subsequent casts are to the same depth, the software will automatically correct for an undershoot or overshoot based on the data received from Connect. The user should not make adjustments to the requested cast depth but should allow the software to make these corrections automatically. If a new depth is entered, the software will revert to using the original drop-time constant for the requested depth.*

Once a cast has been initiated the manual jog controls will become inactive and will remain inactive until the cast has completed. If any repeat options are set (see [section 5.6](#)), the jog options will remain inactive and the beacon will continue to flash.

Using automatic coverage mode

If the winch is receiving a valid water depth message from a network-connected echo sounder (see [section 3.7](#)), automatic coverage mode can be used. This option will automatically populate the '**depth**' field with a user selectable percentage of the water depth. Enabling the option will populate the '**percentage**' field with a default value of 50%.

Allowable values for this mode are **25%** of the water depth (minimum) to **80%** of the water depth (maximum).

When the user clicks the '**Run Cast**' button, a profile will be taken to the depth that the system has populated into the '**depth**' field.

The coverage value is calculated and the depth field is updated whenever a new, valid, water depth message is received.

If any of the three automatic repeat modes are enabled, the user can then conduct 'hands off' profiling to the value populated into the '**depth**' field.

5.6 Repeating a Profile

Repeated casts can be taken in four ways :-

1. Manually, by clicking the '**Run Cast**' button again.
2. Automatically, immediately after the profiler has downloaded its data and Connect has transmitted the winch control message.
3. Automatically, after a certain time has elapsed.
4. Automatically, after a certain distance has been travelled.



Profiling winch

Server ver: 2020.06.12r

Client ver: 2020.06.16

GPS status
TIME: 14:21:02
LAT: 50.691930
LON: -2.327687
Speed (m/s): 0.4
Water depth (m):

Power info
Volts: 246.5
Watts: 23
Power budget: 750w

Cast info
Last cast depth (m):
Scope (m): 0
RPM:
Cast count:
Cast mode: UNDERWAY
Next cast in:

Winch status
E-Stop: GO
Boom lock: LOCKED
Line-limit switch: CONNECTED

Jog control
Jog:
Jog buttons: RELEASED

Settings
Tests
Profile
Plotter

Profile

Run cast Cast depth (m)

Repeat cast on new SWiFT message
 Repeat cast after minute(s)
 Repeat cast every meters

Abort cast

EMERGENCY RECOVER

Automatic repeat options available

Each of these options is exclusive, and can be enabled and disabled at any time before or during a cast. A description of each repeat mode is given below.

Repeat Cast on New SWiFT Message

This option will repeat the cast immediately upon receiving a new message from Connect.

Repeat Cast after 'x' minute(s)

This option will repeat the cast after a user definable number of minutes have elapsed. The timer starts when the software has completed the current cast and has received a new message from Connect, not when the previous cast was started.

Allowable values for this mode are **1 minute** (minimum) to **60 minutes** (maximum).

Repeat Cast every 'x' meters

This option will repeat the cast after the vessel has travelled a certain distance from the point at which the previous cast was started. This distance is calculated using the Haversine formula, and is the distance in a straight line, not the distance travelled along a track. This option requires that the previous cast has completed and the software has received a new message from Connect before it will initiate another cast.

Allowable values for this mode are **250m** (minimum) to **5000m** (maximum).

6. Action if Power Lost

The power-off brake acts to prevent the line unspooling if power is deliberately or accidentally removed. Note that this brake only prevents the spool from rotating in the OUT direction.

In the event of a power failure whilst the profiler is deployed the line can be recovered by rotating the spool manually to recover the line. To do this, remove the protective cap from the LH cover and insert a $\frac{3}{8}$ -inch crank handle to engage directly with the spool axle.

NOTE: Be sure to remove the crank, and replace the cap, BEFORE any power is restored.

7. Action if the Profiler becomes caught

In the event of the profiler becoming caught on an underwater obstruction, the recovery of the profiler at the end of the cast will fail. The software will detect an overload condition and apply the brake, disable the motor to prevent damage and at the same time display a warning to the user.

Continued forward motion of the vessel with the brake engaged will result in the line being pulled off the spool as the load exceeds the brake clutch preload setting. The line is secured to the spool using a breakable connection, preventing the winch or the mounting platform from being damaged in the event that the total line length is pulled from the spool.

Use the crank handle to recover the line, following the instructions in [section 6](#). Cycling the power to the winch will restore normal operation for subsequent casts.

In the event that the profiler cannot be recovered and the line needs to be cut, the line is buoyant which will aid recovery.

8. Routine Maintenance

No routine maintenance is required other than regular cleaning. The main drive belt is toothed and its tension, set in manufacture by adjustment of the position of the motor, should not change.

It is worthwhile periodically checking that the power-off brake, intended to prevent the line unspooling in the event of power failure, is working correctly. It should resist a line pull of 18-20kg before allowing movement at higher pull forces. If adjustment is needed please refer to the Vigo Maintenance manual.

9. Storage and Transport

The winch should preferably be stored and transported in its purpose-designed case.

Ensure that all equipment, including the winch, is dry before packing. Ideally the line should have had time to dry after use although it is recognised that this may not always be possible.

10. Specifications

Line capacity	500m of 2.5mm diameter Dyneema or equivalent
Maximum profiler weight	5kg
Dimensions, boom retracted	625mm (L) x 326mm (W) x 392mm (H)
Length when boom extended	1400mm
Weight	42kg
Power requirement	220-240VAC, 1kW max
Network	10/100 Ethernet, IP address assigned by DHCP
Temperature, operating	-5 to +45 degrees centigrade
Temperature, non-operating	-20 to +55 degrees centigrade
IP rating	IP 66

11. Warranty

11.1 Scope

The winch hardware is warranted for a period of 36 months from the date of dispatch.

The winch operating software is warranted for a period of 36 months from the date of dispatch. Defects will be corrected free of charge during this period.

Any item that fails because of a defect in design, material or workmanship will be repaired or replaced by C-MAX without charge.

11.2 Limitations

C-MAX is not responsible for any consequential loss, nor for any failure caused by improper use, mishandling, or unauthorised attempts at repair, nor for cosmetic or other damage which may reasonably be classed as normal wear and tear.

In particular, if it is apparent from the condition of the profiling winch that it has been abused, then repair or replacement of winch components will not be covered under this warranty.

11.3 Fault Reporting

Faults must be reported to C-MAX within the warranty period, quoting the equipment serial number together with a fully detailed description of the fault symptoms, together with photographs if appropriate.

11.4 Returns

The agreement of C-MAX is required before items are returned to the factory for inspection or repair. The customer is responsible for adequate packing and insurance.

11.5 Transferability

The benefits of this warranty are fully transferred to the current legal owner of the equipment.