



/HydroMet

User Manual

Cable Fox (CFX)

 **KISTERS**
Empowering decisions of tomorrow

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I Disclaimer

The information provided in this manual was deemed accurate as of the publication date. However, updates to this information may have occurred.

This manual does not include all of the details of design, production, or variation of the equipment nor does it cover every possible situation which may arise during installation, operation or maintenance. KISTERS shall not be liable for any incidental, indirect, special or consequential damages whatsoever arising out of or related to this documentation and the information contained in it, even if KISTERS has been advised of the possibility of such damages.

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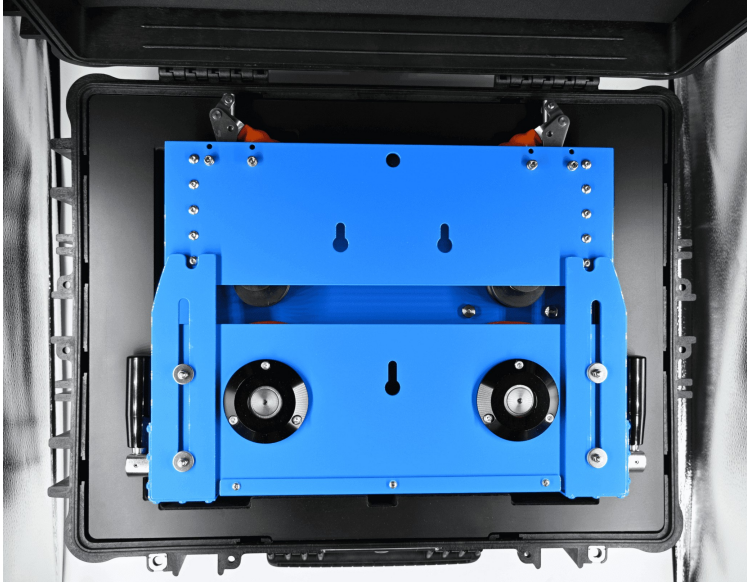
This document is public.

II Scope of Delivery

The unit is delivered in two heavy-duty cases.

Traveller Case

- CFX traveller with integrated motor and drive pulleys



Hoist Case

- 12 V Hoist fitted with 4 mm Dyneema rope, incl. security pin
- Remote control unit
- Antenna for traveller and remote control unit (SMA connector)
- 1 × 100–240 V mains power switching mode power supply - use only for charging remote control fitted with internal NiMH rechargeable batteries
- 1 × battery charge controller car power - use only for remote control rechargeable batteries
- Sealed Lead Acid (SLA) battery holder (to be attached to the CFX traveller) incl. safety pin bracket - maximum holding capacity 21 Ah/12 V dc battery
- 2 Metric Allen Keys (1.5 mm and 4 mm)
- Breakaway Kit

Not included: Remote Control and Carriage Batteries, ADCP Profiler, ADCP Boat/Trimaran, Cableway, 10 kg Stabilising Weight



III Safety Instructions

- Read the user manual including all operating instructions prior to installing, connecting and powering up the KISTERS CableFox. The manual provides information on how to operate the product. The manual is intended to be used by qualified personnel, i.e. personnel that have been adequately trained, are sufficiently familiar with installation, mounting, wiring, powering up and operation of the product.
- Keep the user manual on hand for later reference!
- If you encounter problems understanding the information in the manual (or part thereof), please consult the manufacturer or its appointed reseller for further support.
- KISTERS CableFox is intended to be used in hydrometeorological or environmental monitoring applications.
- Before starting to work, you have to check the functioning and integrity of the system.
 - Check for visible defects on the CableFox, this may or may not include any or all of the following: mounting facilities, connectors and connections, mechanical parts, internal or external communication devices, power supplies or power supply lines, etc.
 - If defects are identified that could compromise operational safety, work must be stopped immediately. This applies to defects detected both before work begins and during operation.
- Do not use the KISTERS CableFox in areas where there is a danger of explosion.
- The present user manual specifies environmental/climatic operating conditions as well as mechanical and electrical conditions. Installation, wiring, powering up and operating the KISTERS CableFox must strictly comply with these specifications.
- Perform maintenance only when tools or machinery are not in operation.
- If guards are removed to perform maintenance, replace them immediately after servicing.
- Never make any electrical or mechanical diagnostics, inspections or repairs under any circumstances. Return the product to the manufacturer's named repair centre. You can find information on how to return items for repair in the relevant section of the KISTERS website.



Disposal instructions: After taking the KISTERS CableFox out of service, it must be disposed of in compliance with local waste and environmental regulations. The KISTERS CableFox is never to be disposed of in household waste!



Inputs and outputs of the device are protected against electric discharges and surges (so-called ESD). Do not touch any part of the electronic components! If you need to touch any part, please discharge yourself, i.e. by touching grounded metal parts.

IV Specific Safety Instructions

As you read these instructions, you will see **WARNINGS**, **CAUTIONS**, **NOTICES** and **NOTES**.

Each message has a specific purpose. **WARNINGS** are safety messages that indicate a potentially hazardous situation, which, if not avoided could result in serious injury. **CAUTIONS** are safety messages that indicate a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. A **CAUTION** may also be used to alert against unsafe practice. **CAUTIONS** and **WARNINGS** identify the hazard, indicate how to avoid the hazard, and advise of the probable consequence of not avoiding the hazard. **NOTICES** are messages to avoid property damage. **NOTES** are additional information to help you complete a procedure. Please work safely!

WARNING

CHEMICAL AND FIRE HAZARD

Failure to observe these instructions could lead to severe injury or death.

- Never operate hoist in an environment containing explosive or combustible material.
- Always remove jewellery and wear eye protection.
- Never lean over battery while making connections.
- Always verify area is clear of fuel lines, fuel tank, brake lines, electrical wires, etc. when drilling.
- Never route electrical cables:
 - Across any sharp edges.
 - Through or near moving parts.
 - Near parts that become hot.
- Always insulate and protect all exposed wiring and electrical terminals.
- Always keep terminal boots as installed and replace when required.

MOVING PARTS ENTANGLEMENT HAZARD

Failure to observe these instructions could lead to severe injury or death.

To avoid injury to hands or fingers:

- Always keep hands clear of rope, rope loop, and D-shackle during installation, operation and when spooling in or out.
- Always use extreme caution when handling D-shackle and rope during spooling operations.
- Always use supplied D-shackle whenever spooling rope in or out, during installation, and during operation.
- Always disconnect the battery connector, before beginning work.
- Always when replacing a battery, disconnect negative terminal first and reconnect negative terminal last.

FALLING OR CRUSHING HAZARD

Failure to observe these instructions could lead to severe injury or death.

- Never use hoist to lift or move persons.
- Always use two persons when lifting and operating the unit.
- Always use the size of rope specified in the product data sheet.

CUT AND BURN HAZARD

Failure to observe these instructions could lead to minor or moderate injury.

To avoid injury to hands and fingers:

- Always wear heavy leather gloves when handling rope.
- Never let rope slip through your hands.
- Always be aware of possible hot surface at hoist motor, drum or rope during or after hoist use.
- Never leave the remote control in an area where it may be used as a step or where tools will be hung or placed on it.
- Always turn the remote control off before displacing it out of your own hands.
- Always keep tools and other electrically conductive equipment away from the remote control.

CAUTION

MOVING PARTS ENTANGLEMENT HAZARD

Failure to observe these instructions could lead to minor or moderate injury.

General Safety:

- Always know your hoist. Take time to fully read this Installation and Operations Guide in order to understand your hoist and its operation.
- Never operate this hoist if you are under 16 years of age.
- Never operate this hoist when under the influence of drugs, alcohol or medication.
- Never exceed hoist or rope rated capacity. This is indicated on the warning label on the hoist bracket itself, minimum 10 kg, maximum 50 kg.

Installation Safety:

- Always use factory approved mounting hardware, components, and accessories.
- Always use grade 5 or better mounting hardware.
- Never weld mounting bolts.
- Always use care when using longer bolts than those supplied from factory. Bolts that are too long can damage the base and/or prevent the hoist from being mounted securely.
- Always mount the hoist and attach the D-shackle to the rope's end loop before connecting the electrical wiring.
- Always spool the rope onto the drum in the direction specified by the drum rotation label and/or documentation. This is required for the automatic brake to function properly.
- Always prestretch rope and respool under load before use. Tightly wound rope reduces chances of "binding", which can damage the rope.
- Always use the breakaway kit supplied with the unit and replace the pin inside the breakaway kit when required. Failure to use the breakaway kit may cause damage to the unit or injury to the user.

MOVING PARTS ENTANGLEMENT HAZARD

Failure to observe these instructions could lead to minor or moderate injury.

Hoisting Safety:

- Always inspect, rope, D-shackle, and microswitch assembly before operating hoist. Damaged components must be replaced before operation. Protect parts from damage.
- Always report any malfunction, unusual performance, or damage to the hoist.
- Never leave remote control plugged into hoist when rigging or when the hoist is not being used.
- Never hook rope back onto itself. This damages the rope.
- Always remove any element or obstacle that may interfere with safe operation of the hoist.
- Always take time to use appropriate rigging techniques for a hoist lift.
- Never hoist when the rope colour change to yellow when lowering, the yellow marking indicates the end of the rope and only few layers left on the drum. If you hoist past the yellow marking, a stopper will activate a microswitch to stop the hoist operation in that direction.
- Never hoist when the rope in the raise position past the stopper. If you hoist past the D-shackle end of the rope, a stopper will activate a microswitch to stop the hoist operation in that direction.
- Never touch rope or hook while in tension or under load.
- Never touch rope or hook while someone else is at the control switch or during hoisting operation.
- Always stand clear of rope and load and keep others away while hoisting.
- Always be aware of stability of vehicle and load during hoisting. Alert all bystanders of the operation, by activating the buzzer on the carriage using the remote control.
- Always keep remote control in your hand and press the Emergency Stop when required.
- Always ensure the battery is fully charged on both remote control and carriage before operating the unit.
- Never swing or twist loads.
- Never leave suspended load unattended.

CAUTION

MOVING PARTS ENTANGLEMENT HAZARD

Failure to observe these instructions could lead to minor or moderate injury.

- Always use a D-shackle with a screw on pin.
- Always ensure the D-shackle is CE approved with the WLL stamped on.
- Never apply load to the center of the bow body.
- Never use a D-shackle whose pin is slightly bent or the thread is worn out.
- Always inspect the D-shackle and its surrounding area for any damages.

NOTICE

AVOID HOIST AND EQUIPMENT DAMAGE

- Never operate the hoist without first attaching a 10 kg stabilizing weight to the supplied Breakaway Kit (see [Installation](#) ¹⁵).
- Never “jog” rope under load. Shock loads can momentarily exceed capacity of rope and hoist.
- Never submerge hoist in water.
- Always ensure hoist assembly is dry after operating in a rainy condition.
- Always store the remote control in a protected, clean, dry area.

1 Introduction

Thank you for choosing our product. We hope you will enjoy using the device.

KISTERS manufactures, sells, installs and operates quality instrumentation, data loggers and communication technology. Products are designed with passion for environmental monitoring and with a deep understanding of the quality, accuracy and robustness needed to fulfil the requirements of measurement practitioners in the field.

The present User Manual will help you understand, install and deploy the device. If, however, you feel that a particular information is missing, incomplete or confusing, please do not hesitate to contact us for further support!

The Cable Fox Model (CFX) is KISTERS latest towing system for deployment of an Acoustic Doppler Current Profiler (ADCP) or radar device for manual discharge measurement on a cableway. The electric motorized vehicle can be easily installed on existing cable cranes by using their cables. Via a radio remote control, the user controls the vehicle forward and backward across the cable transversely to the flow axis.

Product Overview

The Cable Fox is a unique product that allows the towing of an ADCP across an existing gauging site's steel cable. The Cable Fox has the following features:

- 2 standard models are available to cover main cable diameters from 12-14 mm (1/2-9/16") and 16-32 mm (5/8-1 1/4")
- Locks onto the main cable to prevent accidental detachment
- Traversing speed adjustable from 0.01 m/s to 0.60 m/s (0.03 ft/s to 2.00 ft/s) on the remote control
- Traversing distance measured, with waters edge zeroing on the remote control
- Can raise and lower the ADCP to and from the water using the provided wireless remote control
- Hoist automatically stops when raising and lowering, when nearing the end of the hoist rope
 - Hoist rope is provided with a yellow marking near the end of the rope as a visual safety indicator of the rope being fully extended
 - Hoist 'auto-stop' feature when only 4 to 5 wraps of rope are left on the hoist drum
- Cable Fox traversing brakes activated when stationary
- Traversing Brake is released when remote control is switched off to allow manual retrieval of the carriage
- Carriage automatically returns to its Home Position if communications are lost for 2 minutes or more (Home Position is defined as the position where the Cable Fox is firstly turned on – **Safety Instruction:** feature disabled in the European version, to meet the EU Machine Directive.)
- Emergency Stop button to meet the EU Machine Directive



Safety Instruction: The Emergency Stop button has been added to meet the requirements of both the EU Machine Directive and the GB LOLER regulations.

- Frequency Hopping Spread Spectrum - jumps to a new frequency every 400 ms
- Measures Cable Fox Carriage Battery Voltage + Current Draw (Amps), remote control Battery Voltage and RF signal strength
- All fuses are automatically resettable
- Remote control beeps when Cable Fox carriage battery is less than 10.8 V
- If the carriage battery voltage is 10.5 V or less, the carriage can ONLY be moved in a 'return' direction to the original Home Position
- Up to 400 m communication range between the Cable Fox carriage and the operator remote control
- Carriage operates on a single 12 V, 18-22 Ah battery

KISTERS use a model DC800 hoist manufactured by WARN Industries, who produce a large family of hoists and winches. But what is the difference between a hoist and a winch?

Hoists and winches look alike. Both consist of a motor, a rotating drum with wire rope, reduction gears, a base, and usually an electrical control system. However, hoists and winches are used for different purposes.

Hoists are used to lift a load **vertically**, while winches are used to pull a load **horizontally** across the ground. Because a load that is suspended in the air creates unique hazards, hoists are engineered to higher safety standards. And unlike winches, the operator of a hoist may not unwind the cable by "free spooling" or disengaging the motor from the gear train.

While a winch uses a **dynamic brake** specifically designed for rolling load, a hoist uses **mechanical brakes** that are specifically designed to lock and support the load you're lifting. This system is far better suited to vertical lifting.

The mechanical brake generates heat when loads are lowered and the rope is powered out. Care must be taken to avoid overheating the mechanical brake.

With heavier loads allow more time for the brake to cool between uses.

OVERHEATING THE MECHANICAL BRAKE MAY RESULT IN PERMANENT DAMAGE TO, OR FAILURE OF, THE BRAKE. REPLACE ANY DAMAGED BRAKE COMPONENTS BEFORE RESUMING USE OF THE HOIST.

Whine or chatter associated with a new mechanical brake is normal and typically disappears with use

2 Installation

Important: Read Before Installing.

Pre-Installation Check List

Ensure that the following items are available on site at the time of installation:

- Cable Fox Carriage (with fully charged 12 V battery - see [Technical Data](#) ³⁸ for details)*
- Hoist with mounting hardware
- Breakaway Kit
- Remote control (with fully charged batteries)*
- 10 kg Stabilising Weight (this is supplied only as an accessory item)

* Batteries are NOT supplied, these need to be sourced locally

Very Important:

- Ensure the integrity of the cableway is inspected by a suitably qualified civil engineer
- Before you operate the Cable Fox system, you must always install the supplied Breakaway Kit and 10 kg stabilising weight (not supplied).

Mechanical Safety Guards

For safety reasons, Cable Fox are delivered with an enclosure that is closed on all sides. The perfectly closed enclosure prevents any inadvertent and potentially dangerous contact of the user with moving motor or propulsion parts, such as the drive chain.

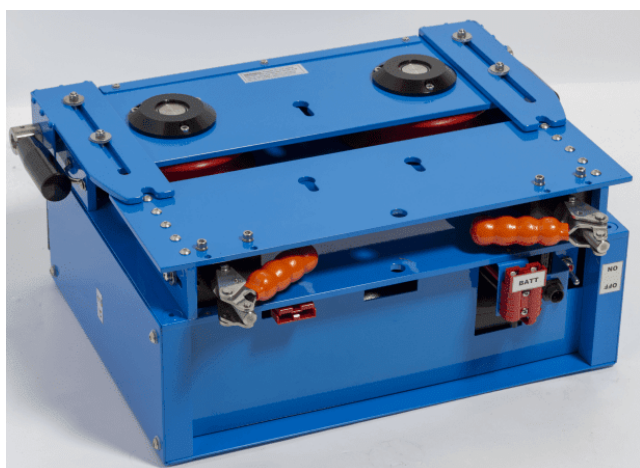


Figure 1 – Cable Fox: metal sheet guard at the bottom of the device

If covers have been removed for maintenance, replace them immediately after servicing and before reconnecting the power supply.

Caution: Some pictures in the manual may show the device with the protective guard removed - this is for illustration purposes only. Do not operate the unit without the guard in place.

Handles



Safety Instructions



Heavy lift, minimum two persons, the weight is approximately 41 kg (90 lbs).



Using and operating the various handles creates a number of potential pinch points!

CFX are equipped with various handles.

Three handle types:

- Grab handles are provided to carry the Cable Fox CFX while not contained in its protective case. Only use the grab handles to carry a Cable Fox CFX.
- Clamp handles are meant to clamp the drive pulleys to the traversing cable.
- Lift handles are meant to open the front lid to either install the Cable Fox on a steel cable or to remove it from the steel cable.

Grab Handles to lift/move the Cable Fox

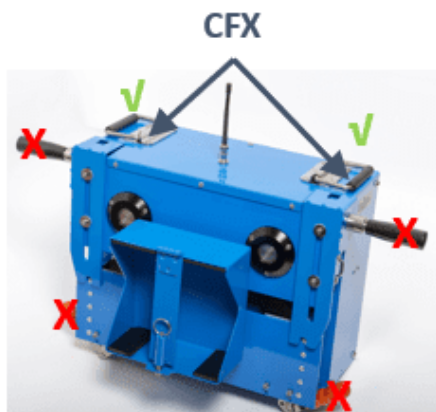
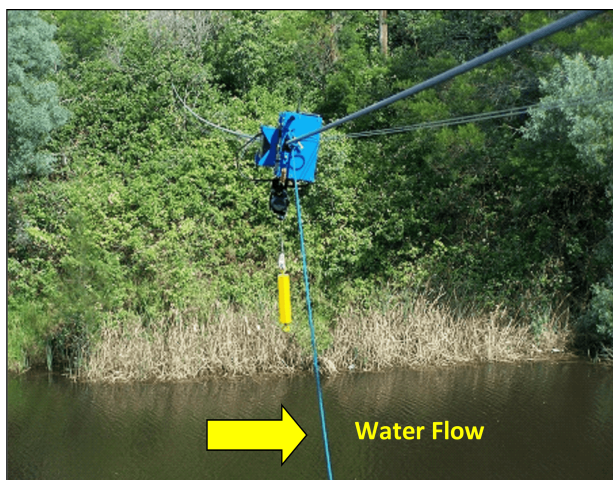


Figure 2 – Cable Fox CFX: Identifying the Grab handle

Steps to Install a Cable Fox

1. Determine the water flow direction and install the Cable Fox on the cable as shown, with the battery box on the upstream side. On each end plate of the carriage 'arrows' can be seen to make this clear.



2. Before lifting the Cable Fox onto the cable, fit the antenna onto the BNC fitting on top of the cabinet. Squeeze the plastic at the bottom of the antenna and rotate clockwise.

Note: Excessive bending may damage the internal components of the antenna and affect its performance.



3. Make sure the orange tension handles are angled to the centre – this gives the maximum clearance between the rollers for the Cable Fox to fit onto the cable. See pictured below (3).



Safety Instructions

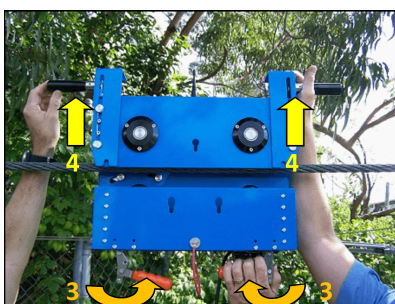


Heavy lift, minimum two persons, the weight is approximately 41 kg (90 lbs).

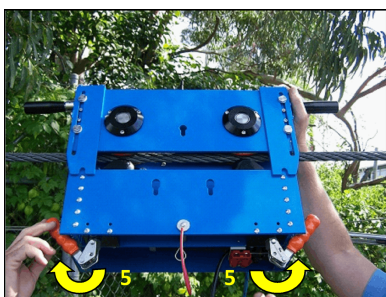


Hanging of the trolley creates a number of potential pinch points.

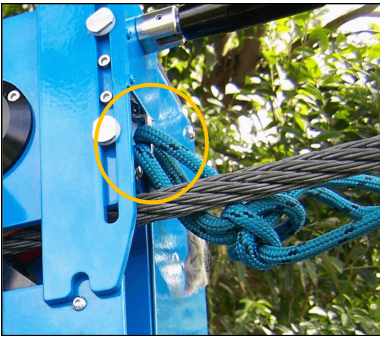
- Use trolley lifting handles provided.
- If there are any concerns regarding handling please contact your supervisor.
- It is the user's responsibility and obligation to determine and comply with all applicable laws and regulations.



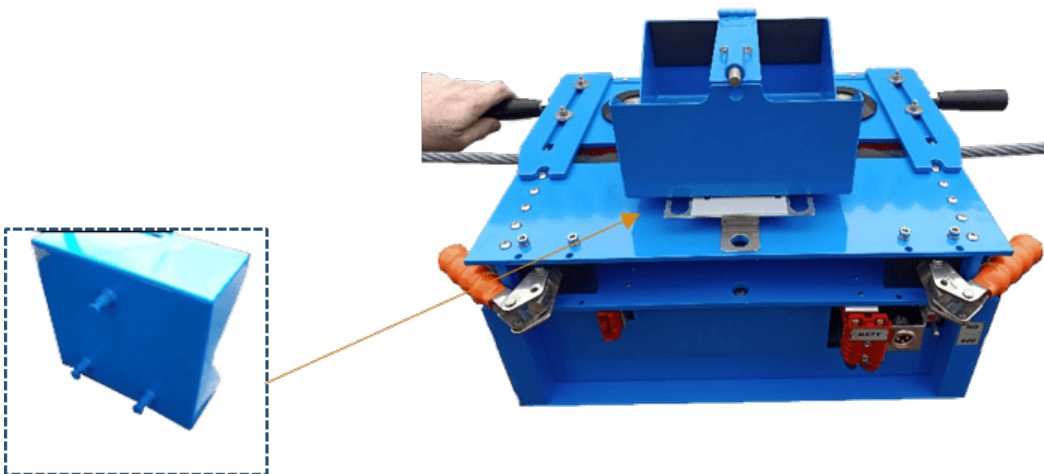
4. Lift the Cable Fox onto the main cable using the lifting handles as shown in the picture above (4).



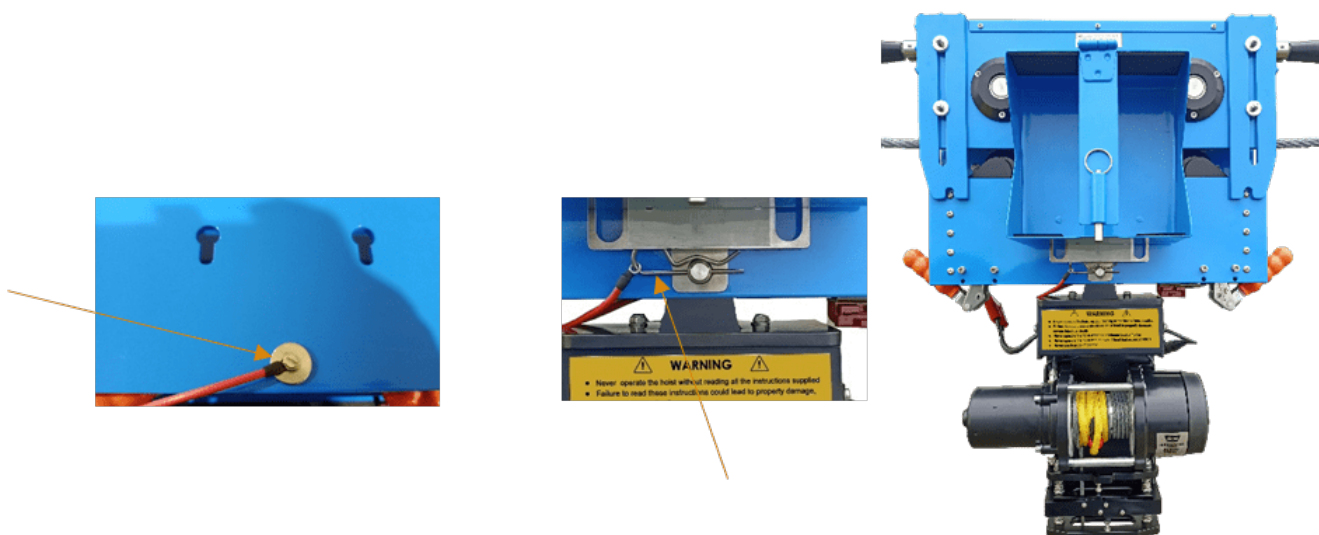
5. Move the orange tension handles to the outside to provide tension between the drive rollers (red) and the black guide rollers (see picture above).
6. At the operator's discretion, a safety rope can be attached to the operating bank side of the Cable Fox frame (see picture below) as a precautionary measure to assist in retrieval in the unlikely event of a problem with the traveller drive system or battery failure. In this scenario, please ensure that the remote control has been switched off to allow the traveller brake to be released before attempting to retrieve the traveller manually.



7. Attach the battery holder to the trolley before fitting the battery. Fit the 3 pins starting with the single pin through the hole in the traveller frame, then lower the battery box until the other 2 pins line up with the holes on the traveller frame, then lower into the slots until secure. Lower the stainless steel retaining bracket on the battery box by sliding it down until it is aligned with the hole for the retaining pin on the traveller frame.



8. Insert the hoist into the bottom of the Cable Fox and insert the retaining pin through both the battery box retaining bracket and the hoist bracket, then secure the retaining pin in place using the R-clip. Care should be taken to ensure that the retaining pin is securely fixed as shown in the 3 pictures below.

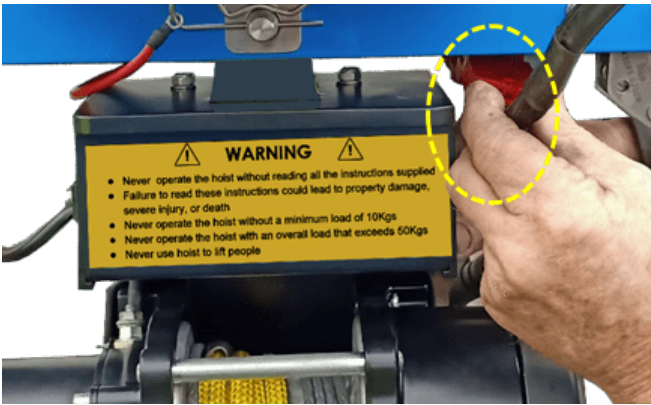


9. Attach:

- the carriage battery to the battery holder, ensuring that the spring loaded pin on the battery retaining strap is fully engaged in the pin hole on the battery box
- [breakaway kit](#) (see Appendices > Breakaway Kit > Installation)
- stabilising weight (minimum 10 kg) if purchased.
Note: Ensure that the overall load, including stabilising weight and measuring equipment, does not exceed 50 kg (110 lbs).
- the ADCP sensor to the stabilising weight or ADCP tether. Make sure there is at least one metre of space between the stabilising weight and the sensor. That distance should be increased in rough water conditions or a flood situation to avoid the breakaway kit from getting caught by debris (e.g. tree etc...)



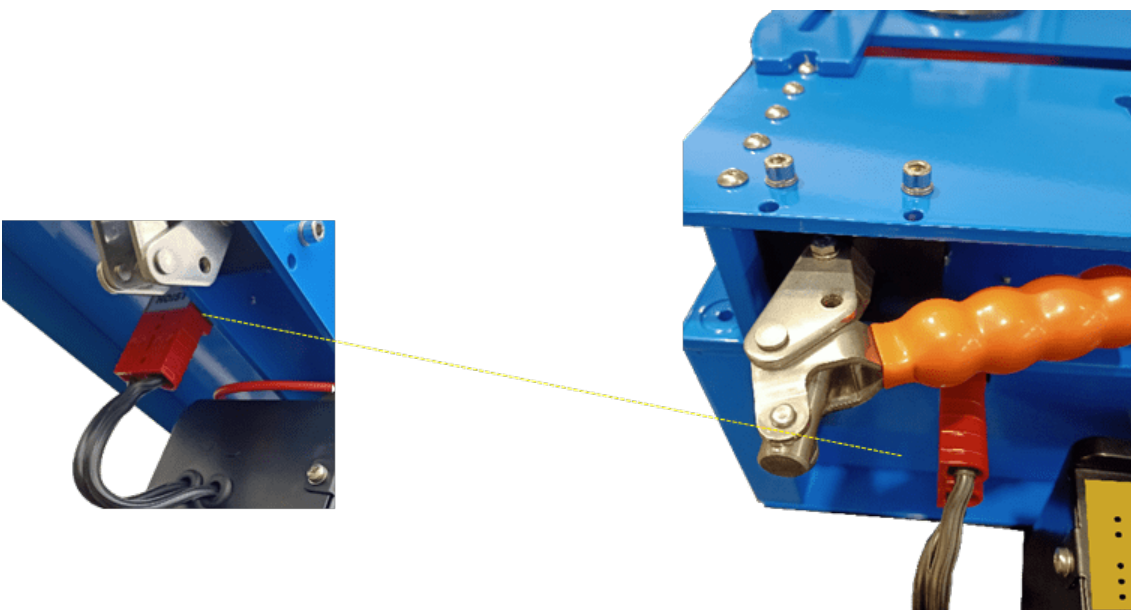
10. Plug the battery power lead into the carriage connector (see picture below).



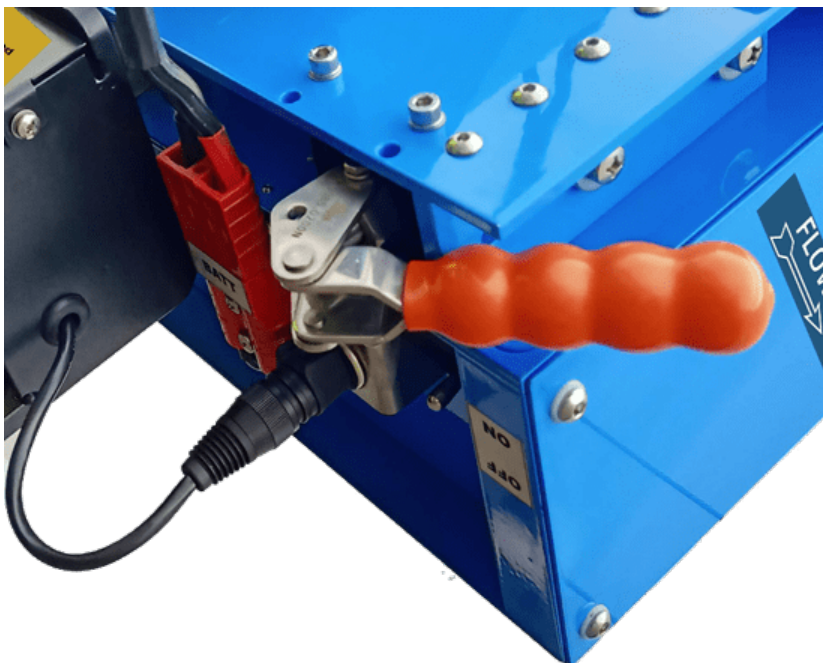
11. Plug the 3-pin hoist control cable into the Cable Fox and push until the latch on the connector engage with the 3-pin male connector (see picture below). **Note:** To release the connector, first press the release tab and then pull in a downward direction to unplug from the plug socket (see picture below).



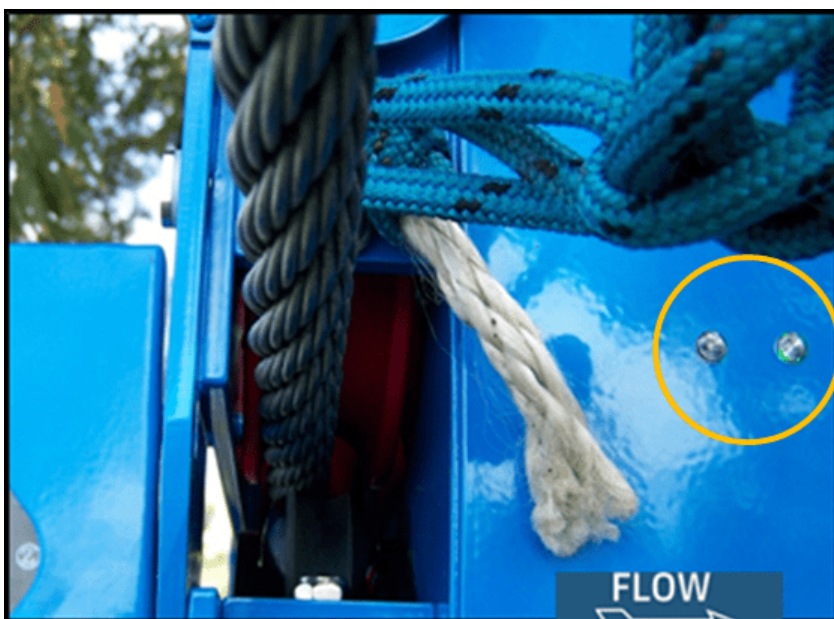
12. Connect the hoist connector to the plug on the carriage (see picture below).



13. Set the toggle switch on the unit to 'ON'.



14. The red and green LEDs on the side of the Cable Fox enclosure will flash alternately. Turn on the remote control and the green LED will flash quickly, indicating that the communications are working properly.



NOTE 1: If the FWD switch does not move the Cable Fox in the forward direction, operation can be reversed through the CFox... menu option on the remote control.

NOTE 2: When the remote control communications are operating and the Cable Fox is stationary, a brake is applied to the traversing motor. If the remote control is turned off, the brake is released for easy retrieval by rope.



Safety Instructions: The following functionality is available only on items produced for and sold into markets not regulated by the EU Machine Directive and/or GB LOLER regulations: If the Cable Fox loses communications for a 2-minute interval, it will automatically return to its 'HOME' position – that is the position when the power was switched on. A beeper will sound for 10 seconds before this commences, and also during the return motion.

3 Configuration

The only configuration required is when a new remote control is purchased and needs to be paired with an existing carriage, for more details refer to the [Operation](#) ²⁸ section of this manual.

4 Operation

Carefully remove the remote control from the carrying case and attach the antenna. Take particular care when installing and storing the antenna, as excessive bending may damage the internal components of the antenna and affect its performance. Press and hold the Power button on the remote control and the LCD will come on. The red LED on the remote control should turn off when communication is established. The green LED will flash as the remote control communicates with the Cable Fox.

Note: Before returning the remote control to the carry case, remove the antenna and store it in the correct location.

Name	Description
SPEED Control	Variable speed control for the carriage
LCD display	View distance, speed, voltage, current draw, status, etc.
ZERO Button	Turn power ON/OFF, set 'zero' at start point across the section when prompted
EMERGENCY STOP Button	Press to activate 'stop', rotate clockwise to deactivate 'stop'
FWD/REV Toggle	Move carriage forward and backward (reverse) across cableway
RAISE/LOWER Toggle	Raise and lower ADCP
SCROLL MENU Knob	Rotate to scroll through menus and push to select
Green LED (ALARM)	Flashes when communications are OK
Red LED (ALARM)	Indicates a communications error



Check [EU/UK Amendment 201](#) for adapted front display of [remote control 221](#) unit and explanations of [Emergency Stop button 201](#) for European/UK units (for work safety compliance).

- [Brief Description of Controls](#) ²⁰
- [Menu Operation](#) ²⁵

4.1 Brief Description of Controls

With its clear layout and limited number of buttons and switches, the remote control unit is understandable, safe, quick and does not cause any manipulation mistakes. The remote control device is designed so that its layout, movement and counter-effect to movement are in accordance with the performed actions, at the same time considering the fundamentals of ergonomics.



Safety Instructions: At all times, the user and the remote control device must be placed outside the hazard area.

Emergency Stop



Safety Instructions: The remote control unit is equipped with a large red Emergency Stop button: see [Figure CFX Remote Control Unit with Emergency Stop Button](#) ²⁰.

The Emergency Stop button has been added to provide compliance with both the European Machine Directive and the UK LOLER regulations. The functionality follows EN14492-1. When the Emergency Stop is pressed:

- The Cable Fox will stop immediately.
- The Cable Fox will not respond to “Fwd/Rev” or “Raise/Lower” commands from the remote control.
- The remote control will display “Emergency Stop” on the LCD.
- The remote control will beep continuously while in Emergency Stop to get the users attention.



Figure 3 – CFX Remote Control Unit with Emergency Stop Button

To remove the system from “Emergency Stop” mode, rotate the red button in the direction of the arrows and it will click upwards – normal operation will resume.

Power + Zero

Press and hold the blue button to turn on the remote control (wait until the LCD comes on) When the remote control is “on”, press and hold the blue button to turn off the remote control. When a zero is required, the user will be prompted to press the “zero” button with a “Z” and a down arrow symbol on the lower right hand side of the LCD.



Speed

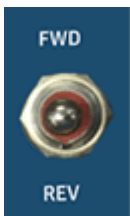
The speed control knob sets the Cable Fox traversing speed. When using an ADCP it is important to traverse the water at a constant speed. (The speed is displayed on the main menu in either m/s or ft/s, depending on the units selected in the Remote... menu.)



Fwd / Rev

The Fwd / Rev toggle switch controls the traversing movement. If there is any problem, the cause will be displayed on the LCD while the switch is being operated.

Safety: The Cable Fox stops moving whenever the control is released.



Raise / Lower

The Raise / Lower toggle switch controls the hoist. If there is any problem, the cause will be displayed on the LCD while the switch is being operated.

Safety: The hoist stops moving whenever the control is released.



Red and Green LED

When the red Status LED is on, it indicates there is a problem. This could be due to Communications, low Cable Fox battery, low remote control battery, or drive control problems.

The green LED flashes whenever comms is successful to the Cable Fox.



Menu Navigation

The menu navigation is performed by rotating the "Scroll Menu" knob clockwise and anticlockwise. Pressing the same knob allows the operator to select options etc.. See the section on navigating the menus for a full description.



LCD + Backlight

The LCD has backlighting, which can be always OFF, always ON, or on for several seconds when anything is touched. The LCD backlighting option can be changed in the "Remote..." menu.



Sounder

The remote control has an inbuilt sounder, which beeps when the Cable Fox battery is less than 10.8 V.

Safety: For compliance reasons with EU and GB safety regulations, all CFX delivered into EU or Great Britain do not support the automatic return function. It is thus important to watch battery voltage and react when the sounder beeps.

Operating Frequency

EU model (868 MHz band) and US model (915 MHz band):

Operate by "frequency hopping spread spectrum" – and automatically jump to a new frequency every 400 ms. (The user cannot change frequencies, it is determined by the model.) This provides a line of sight range of about 400 m.

The remote control Unit is a so-called short-range device (SRD). It incorporates a short-range radio transmitter for unidirectional communication with little capability of causing interference to other radio equipment.

For global incl. European compliance, the radio transmitter uses the multiregional SRD frequency allocation 868 MHz (see Table [Multiregional SRD Frequency Allocations](#)^[22]).

Note: The European/UK remote control unit omits the frequency select menu available for units sold into markets other than the European Single Market and the UK Market.

Multiregion Allocations	Comments
868 MHz ISM Band	Licence free in the EU and GB
915 MHz ISM Band	Licence free in the USA, Canada, Australia and New Zealand

Table 1 – Multiregional SRD Frequency Allocations

The 868 MHz band is especially useful in Europe and in the UK, as it does not restrict applications, and it allows more compact antenna implementations. Remote control units delivered with CFX models ending on "-EU" follow the latest European regulations.

The remote control unit accompanying CFX 1"-EU" units is compliant with a series of European standards as listed in Table [European SRD Band Regulations](#)^[23].

Region	Relevant Standards	Frequency Bands (MHz)	Relevant Links
Europe	ERC REC 70-30 EN 300 220 (Sept. '00) EN 300 220 (Feb. '06)	433.05 to 434.79 868.0 to 870 863.0 to 870	https://www.ero.dk http://www.etsi.org

Table 2 – European SRD Band Regulations

The CFX Remote Control Unit uses frequency-hopping spread-spectrum (FHSS) transmission technology to spread energy in the time domain by dividing the spectrum into a number of channels (see Table [European Channel Requirements](#)), switching between them in a pseudo-random sequence, or “hopping code,” that is known by both the receiver and transmitter.

Subband	Number of Hop Channels	Power/Magnetic Field	Other Requirements
865 MHz to 868 MHz	≥ 60	≤ 25 mW ERP	LBT or < 1 % Tx duty cycle
863 MHz to 870 MHz	≥ 47	≤ 25 mW ERP	LBT or < 0.1 % Tx duty cycle

Table 3 – European Channel Requirements

The CFX Remote Control Unit also respects European regulations imposing restrictions on transient power, defined as the power falling into the adjacent spectrum when the transmitter is switched on and off during normal operation. This limit has been added to prevent spectral splatter.

Previous model

The Cable Fox components communicate to each other in the 915 MHz band which is the ISM (Industrial, Scientific and Medical) license free band. There are 26 channels available, which can be user selected at any time. The frequencies used are 902.5 MHz through to 914.5 MHz in the USA (with a 1 MHz channel spacing) and 915.5 MHz to 927.5 MHz in Australia (with a 1 MHz channel spacing). The transmitter power is +15 dBm, which is equivalent to only 32 mW. This provides a line of sight range of about 400 m.

NiMh Battery Charging

The handle of the remote control has provision for charging the internal NiMh batteries that power the remote control. A mains power plug-pack and a vehicle cigarette lighter adapter are supplied. The voltage required is 12 V dc with a capacity of 1 A. (A 9 V dc to 18 V dc plug-pack can be used.) The connector is a dc Power 2.1 mm connector with center pin +ve. The charging socket is polarity protected. If the remote control is off when the charging plug is inserted, the remote control will automatically turn on, and indicate it is charging by scrolling the Remote battery indicator. The batteries will be initially fast charged at about 500 mA, and when fully charged drop back to a trickle charge – so there is no problem with leaving it plugged in for extended periods.



In an emergency you can use 3 × AA Alkaline batteries to power the remote control. Simply remove the 4 screws that secure the front panel of the remote control, then remove the lower screw on the strap over the 3 batteries and rotate the strap out of the way. Replace the 3 × NiMH batteries with 3 × alkaline batteries and re-assemble the remote control.

Note: AA alkaline batteries cannot be charged using the mains and 12 V chargers supplied. Connecting the chargers to the remote control when fitted with standard non-rechargeable batteries could result in damage to the unit and a potential fire hazard.



Safety Instructions: Do not attempt to charge while alkaline batteries are installed.

Attempts to recharge standard alkaline batteries may cause rupture, or the leaking of hazardous liquids which will corrode the equipment.

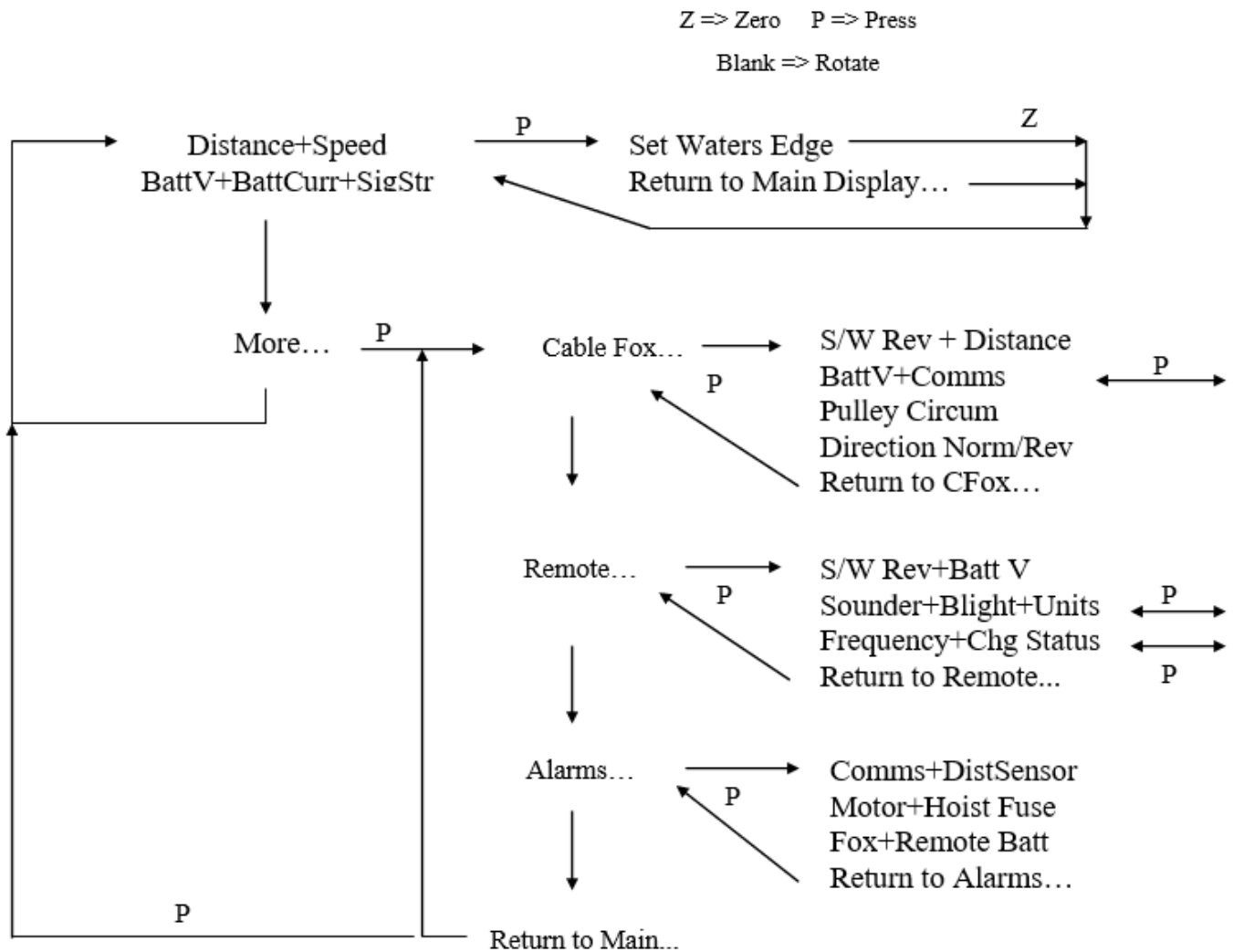
Sealed Lead Acid Battery Charging

Correct maintenance of sealed lead acid batteries is essential, including charging with a suitable charger designed for this type of battery chemistry. To ensure correct compatibility, please contact your battery supplier for advice on the type of charger to use for your application. Some battery chargers are capable of charging several different battery chemistries, so please ensure you select the correct setting for your specific battery chemistry. Battery chargers with a charge current of 2 - 4 amps and float charge capability should be selected to ensure that the batteries are not overcharged, which could cause a fire hazard.

4.2 Menu Operation

As previously stated, the controller menu is navigated by rotating and pressing the “Scroll Menu” knob.

The main menu shows the most used information. Pressing the scroll menu knob while in this menu allows the Set Waters Edge function to be performed. Stepping into the More... menu allows data specific to the Cable Fox, Remote Control and Alarms to be displayed.

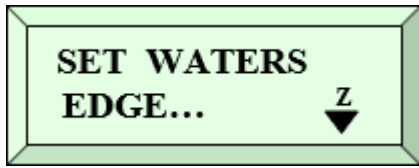


Note that if a measurement cannot be displayed due to a comms error, the data will be displayed as “-.- -”.

- [Set Waters Edge](#) 
- [More...](#) 
- [Cable Fox...](#) 
- [Remote...](#) 

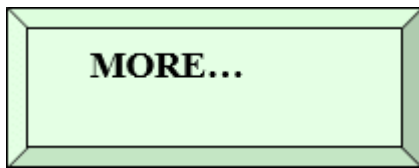
4.2.1 Set Waters Edge

Position the weight so that it is just above the closest waters edge. Press the blue Zero button. This will zero the horizontal distance counter so the river width can be measured.



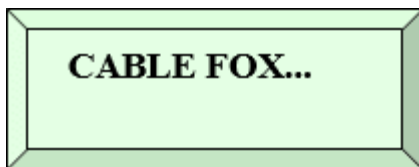
4.2.2 More...

This menu item is the door to CFox... Remote... and Alarms... menu. Press the menu scroll knob to enter the CFox... menu.



4.2.3 Cable Fox...

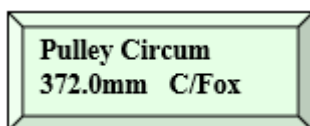
This menu is the entry point to view the Cable Fox information (Battery Voltage, S/W Rev) and change Cable Fox parameters (Backlighting, Sounder, Units, Operating Frequency). Rotate the menu scroll knob to step to the Alarms... menu or press the menu scroll knob to view Cable Fox information.



- [Cable Fox Pulley Circumference](#) 
- [Cable Fox Direction/Alert](#) 
- [Cable Fox Run Timer](#) 

4.2.3.1 Cable Fox Pulley Circumference

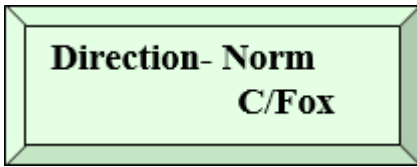
The distance measurement of the Cable Fox relies upon the circumference of the drive rollers. If the distance measurement is incorrect, adjust the Pulley Circum parameter and retry the distance measurement.



4.2.3.2 Cable Fox Direction/Alert

When the Cable Fox is put onto the main cable, the drive direction and distance measurement may not be the correct sense – when the FWD toggle switch is pressed, the Cable Fox should move away from the bank you have setup on. Changing the 'Direction' setting from Norm to Rev will correct this.

The Cable Fox has an Alert Sounder that beeps whenever it traverses or raises/lowers the hoist – the "Alert" option allows this sounder to be Enabled and Disabled. (Only available in some models.)

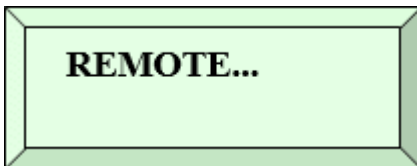


4.2.3.3 Cable Fox Run Timer

The Cable Fox continually accumulates the time it has been powered on for. This starts at 0.0 when it is manufactured and increments in 0.1 hr steps for its entire life – and cannot be zeroed. This feature is only available in some models.

4.2.4 Remote...

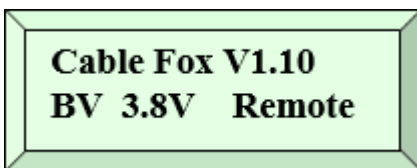
This menu is the entry point to view the Remote Control information (Battery Voltage, Charging Status, S/W Rev) and change Remote Control parameters (Backlighting, Sounder, Units, Operating Frequency). Rotate the menu scroll knob to step to the Alarms... menu or press the menu scroll knob to view Remote Control information.



- [Remote S/W Rev and Battery Voltage](#) 
- [Remote Sounder, Backlight and Units](#) 
- [Communication Frequency and Charger Status](#) 
- [Pairing a Remote Control with a Cable Fox](#) 
- [Return to Remote...](#) 

4.2.4.1 Remote S/W Rev and Battery Voltage

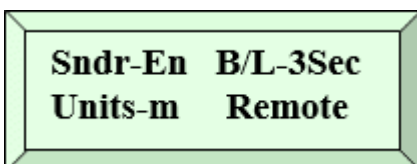
The top line of the LCD displays the Remote Control Software Revision and the bottom line displays the voltage of the batteries inside the remote control.



4.2.4.2 Remote Sounder, Backlight and Units

The top line of the LCD displays the present state of the Sounder (Enabled or Disabled) and the present state of the Backlight (Always Off, On for 1 Sec, 2 Sec,...9 Sec after a control is touched, or always On).

The bottom line of the LCD displays the state of the system Units (either meters or feet). These options can be changed as follows: Press the menu scroll knob and the sounder "En" will flash, rotate the knob to change the selection, and press the knob again to save the selection. When the menu scroll knob is pressed again, the backlight option will flash – rotate the menu scroll knob to change the selection and press the knob to save the selection. When the menu scroll knob is pressed for a third time, the unit "m" will flash – rotate the knob to change the selection and press again to save the selection.



4.2.4.3 Communication Frequency and Charger Status

EU and US Models

The present EU and US models (see suffix of serial number) operate by “frequency hopping spread spectrum” – and automatically jump to a new frequency every 400 ms. The LCD will just indicate which band the system is operating on, and the bottom line of the LCD displays the charger status (either Off, On or trickle charge). There are no settings you can make. The next display indicates the signal strength in dB.

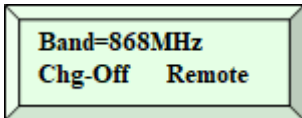


Figure 4 – EU Model

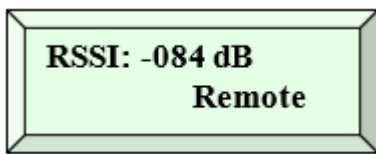
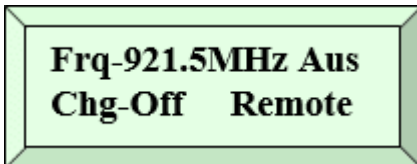


Figure 5 – US Model

Previous Model

The previous model operated on a single frequency that is selectable by the user. The LCD displays the present communication frequency selected (902.5 MHz to 914.5 MHz is license free in the US and 915.5 MHz to 927.5 MHz is license free in Australia) and the bottom line of the LCD displays the Charger status (either Off, On or trickle charge).



Note: Before changing the communication frequency, make sure that the Cable Fox is powered on and communicating properly. When the Frequency is changed on the remote control, it automatically updates it in the Cable Fox electronics.

When the menu scroll knob is pressed, the frequency “921.5” and the “Aus” will flash, rotate the knob to change to one of 26 different frequencies, and press the knob again to save the selected frequency and issue a request to the Cable Fox electronics to change its frequency as well. The communications will continue seamlessly at the new frequency.

If for some reason there is no communications between the remote control and the Cable Fox, then simply return to the last frequency used (or step through, select and save each of the 26 different frequencies one at a time, until it picks up communications again) – and then step to the new required frequency.

4.2.4.4 Pairing a Remote Control with a Cable Fox

In previous models of the Cable Fox, any remote control is able to control any Cable Fox (providing it is operating on the same frequency band.) This new feature introduced in remote control V 2.10 allows each remote control to be individually paired with a Cable Fox – which allows systems to operate in the close vicinity of each other.

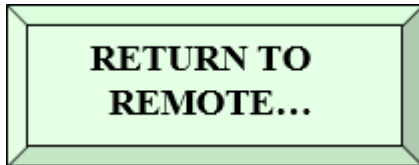
Each Cable Fox is programmed at the factory with a Serial Number – which is shown as the paired device on this remote control menu. It may be necessary to pair the remote control with a different Cable Fox by the operator. This is achieved by:

- Navigate to the Remote – “Paired with CFox” menu.
- Press and hold the Select button for 5 seconds and the menu will change and read...
- Power down the Cable Fox you wish to pair with and wait 5 seconds.
- Power up the Cable Fox you wish to pair with.
- (For the first 3 seconds when it is powered up, it looks to see if any remote control wishes to pair with it.)

- The remote control menu will display the Serial Number of the Cable Fox – check this number with the Serial Number label on the Cable Fox itself.
- Press the Select button and the remote control and Cable Fox will pair themselves and resume normal communications. This pairing between the remote control and Cable Fox is saved into non-volatile memory, so the next time they are powered up they will resume this paired connection.

4.2.4.5 Return to Remote...

Press the menu scroll button to return to the Remote... Menu.



5 Maintenance

There are a few routine maintenance steps that should be performed, to ensure continued safe operation of your Cable Fox system:

Chain Lubrication

The lubrication of the chain drive (see below) should be checked every two years. If it appears that the chain requires lubrication, apply suitable chain lubricant (e.g. Thred-Eze Ultra or similar), preferably with a brush. Apply some – run the drive – apply more to the new visible part of the chain, until the chain is well covered.



Figure 6 - Lubrication of the drive chain

Hoist



Figure 7 - Hoist

Hoist Rope

Before each use, check that the nylon rope doesn't have any nicks or cuts – especially at the end where the ADCP is attached. In a situation where the rope needs replacement due to wear and tear, the part number to order the rope is MON32_SGAUGS1CF4101X.



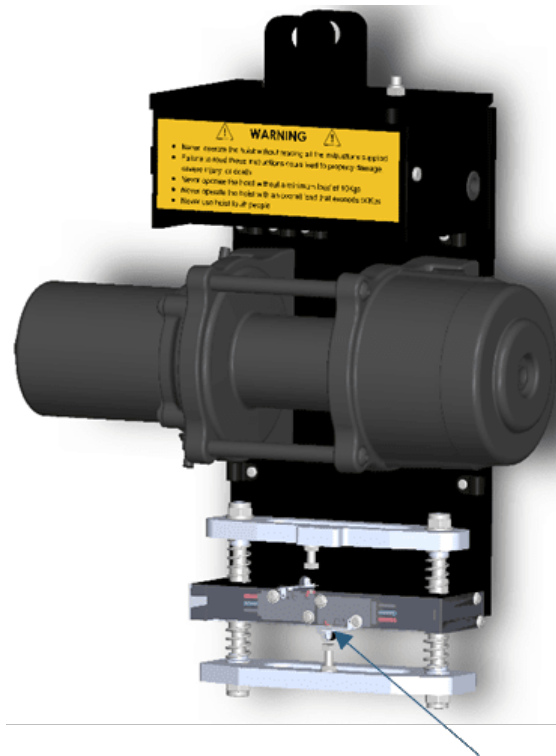
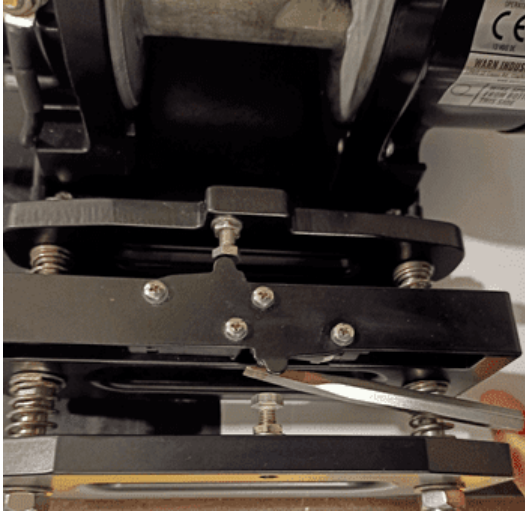
Important: To ensure that the rope is correctly laid on the hoist drum, tension must be applied to the rope as the hoist is raised and lowered.

Hoist Rope Layering

After using the hoist in a session, check the rope lay. If it is tangled in one place, it may need to be unwound using the remote control and rewound onto the drum. Take extreme care not to have your hands within 2 metres of the hoist drum when repositioning the rope on the drum.

Hoist Up Direction Stop Switch

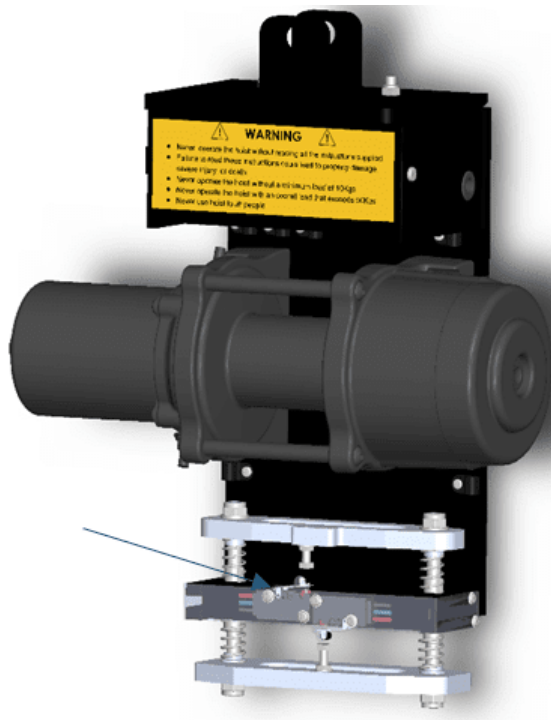
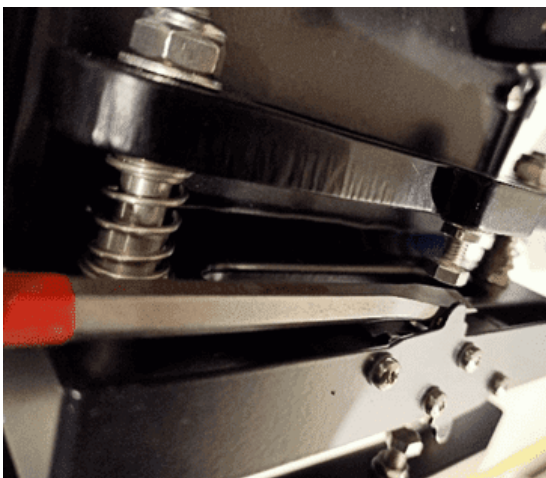
The hoist has a microswitch that stops the upward motion if the rope is driven beyond the fully up position. After re-layering the rope (above), check the switch is operating correctly by carefully driving the hoist close to its fully up position and pulsing the up switch during that last part of the travel, to make sure the hoist stops. Another option to check the microswitch is using the tip of a flat head screwdriver (**Note:** Do not use your finger.) press the lever on the microswitch and push the toggle switch on the remote control in the up direction; if the hoist does not operate this indicates that the microswitch is working properly.



Hoist Down Direction Marking and Stop Switch

The hoist is fitted with a rope, a yellow marking will appear towards the end of this rope (when lowering) to alarm the user to stop lowering. In a situation where the user fails to see the yellow marking to stop, a rope stopper will activate the upper microswitch to force the hoist to stop in the downwards motion. Using the tip of a flat-head screwdriver (**Note:** Do not use your finger.), press the lever on the microswitch and push the toggle switch on the remote control in the lower direction, if the hoist does not operate this indicated that the microswitch is working properly.

Note: A minimum of 10 kg is required to activate the down motion of the switch.



Battery Connections

When charging the battery, take the time to check the terminals where the battery cables are bolted to the battery. Check they are clean and free from corrosion, and the bolts are securely tightened. Lightly applying grease to the terminals when assembling can prevent corrosion.

6 Troubleshooting



Safety Warning: The following section describes operations on mechanical and electrical parts of the Cable Fox CFX. **Please note** that acting on mechanical parts, the removal of safety covers to access certain parts of the device or the manipulation of electrical power may only be done by adequately trained personnel. The user/operator/technician is responsible for respecting the national/regional/local safety regulations!

Potential hazards:



Lifting hazard!



Itching/Entanglement hazard!



Electrical hazard! In normal conditions no real hazard as only standard batteries are used with max. voltage of 12 V dc. Beware that short-circuiting batteries can cause hazards. The Cable Fox CFX draws many amps from the battery - do not touch any electrical contacts!

Remote Control

Remote Control not communicating with the Cable Fox

- Make sure both the remote control and the Cable Fox are powered on. The LED's on the Cable Fox should be flashing alternate red/green while waiting for communications.
- Make sure the remote control is the one supplied with the Cable Fox. (The -EU and -US model operate by frequency hopping whereas the previous model operates on a single frequency - and the two types are not interchangeable!)
- Check that both the remote control and the Cable Fox have their antennas firmly attached.
- Move the remote control and the Cable Fox within a few meters of each other, if they are not already.

On the remote control, navigate to the Remote menu that displays the operating frequency. If the display says "Band=" then the remote control will be continually scanning through all frequencies to find the Cable Fox - if however, the display says "Frq-" then press the "Select" button to start a search function. For S/W Rev 1.41 or lower the following is applicable:

- If the Cable Fox is not communicating, it will display the message "To Search Press z". When the blue "Zero" button is pressed, the remote control will search through all 26 frequencies (3 times) to find the Cable Fox. If found, it will tell it to change to the selected frequency. If not found, the remote control will return to the selected frequency.
- Alternatively, you could also scroll to the first frequency and press the Select button. If the Cable Fox is found it will start communicating. If it is not found press the Select button again and scroll to the next frequency. Repeat this process stepping through all 26 frequencies until the Cable Fox starts communicating.

Remote Control LCD not operating properly and cannot navigate menus.

- Make sure the remote control NiMH batteries are fully charged - or replace them temporarily with 3 × 1.5 V AA alkaline batteries. (DO NOT plug the charger into the remote control while alkaline batteries are installed!)
- Remove the front cover of the remote control by unscrewing the 4 corner screws and check that the ribbon cable is firmly inserted into the multi-pin socket on the LHS of the printed circuit board (PCB).
- Remove one battery from the holder, wait a minute or so and then put it back in again, to force the remote control to perform a hard reset.

Remote Control battery is not lasting after being charged

- Check that you do have NiMH batteries installed in the remote control, and that someone hasn't replaced them with alkaline batteries at some stage - this can be dangerous if you try to charge alkaline batteries.
- When the charger is plugged into the remote control, the display will automatically come on and the battery symbol will indicate it is charging - leave it charging for 4 to 4.5 hours (or overnight) - after this time it will automatically drop back to a trickle charge.
- Remove the 3 × NiMH batteries and try charging them in a commercial NiMH battery charger - if they still won't hold their charge replace them with new NiMH batteries and recharge the remote control. (You should be able to purchase these from a battery specialty store, or even some grocery stores.)

Green light is flashing but the Red light is also on

The green LED flashes each time it communicates with the Cable Fox – the red LED on means there is a problem. Navigate through “More...” to the “Alarms...” menu to see what the problem is. It could be one of the following:

- Cable Fox comms error.
- Cable Fox battery is low (< 10.8 V) (Cable Fox will only move towards home.)
- Remote Control battery is low (< 3.45 V)
- Drive Motor Current is high (> 50 A)
- Drive Motor thermal fuse has tripped. (Wait and it will reset itself.)
- Hoist thermal fuse has tripped. (Wait and it will reset itself.)
- Quadrature Encoder error. (Not detecting the drive motor turning)

Fwd/Rev Drive Control

There are no LEDs flashing on the Cable Fox Motor Drive

- Check that Cable Fox on/off switch is in the ON position.
- Check that the 12 V battery Anderson connector is plugged into the connector labelled “BATT”.
- Check that the battery terminals are connected the right way around : red to +ve and black to -ve.
- Check that the 12 V battery is charged.
- Check that the green 10 way connector is firmly plugged into the black box.
- Check that the wires plugged into the terminals labelled “On/Off Sw” are connected securely.

The Motor Drive isn't moving forward or reverse.

- Check you have communications between the remote control and the Cable Fox – the remote control green LED will be flashing – and the Cable Fox green LED will also be flashing.
- Check that the Emergency Stop button is not pressed – the LCD would indicate this, and the remote control would be beeping if this was the case.
- Check the remote control LCD to see if any error messages appear while operating the Fwd or Rev switch – these may give an indication to the problem.

If the above items are all OK, but the motor still does not move then maybe the problem is the “black box” motor controller electronics:



Safety Instructions: The following diagnosis procedure is for advanced users with suitable training and technical skill levels only! It is the responsibility of the user to respect all national/regional/local safety regulations.



Safety Instructions: When removing the CFX bottom and side cover plates the the main motor and its chain drive are directly accessible. Pitching/Entanglement Hazard! Be careful to keep fingers out of dangerous places while ever the battery is connected.

- Test if the motor itself is operating OK by bypassing the electronics. Unplug the battery and then remove the Cable Fox side cover plate. Check to motor chain drive path to ensure it is not jammed in any way. Unplug the motor from the “black box” controller (by unplugging the red Anderson connector) and momentarily plug the battery connector directly into the motor connector. If the motor turns, then maybe the problem is in the motor control electronics.

The Motor Drive is only moving in one direction.

- This is a Cable Fox feature – if the 12 V battery voltage is < 10.8 V then the Cable Fox will only move towards the “home” position – that is, the point where it was first turned on. This prevents the Cable Fox from being irretrievable.

Traversing Distance not measuring correctly

- The distance is measured by an encoder that is rotated by the internal chain drive :
- If the distance is not changing at all, then check that the encoder is rotating – and if that is OK, then check the wiring between the encoder and the electronics (plugin connector). Check each wire is correctly clamped by the terminal and check that the multiway connector is firmly plugged in.
- If the distance is not measuring accurately, then check the remote control menu for C/Fox “Pulley Circum” (Circumference) menu. The circumference of the drive pulley is critical to the distance measurement – adjusting the value in this menu will allow the distance measurement to be fine tuned.

Up/Dn Hoist Control

The Hoist doesn't move up – or maybe down.

- Check that the hoist power (Anderson connector) and the hoist control (3 pin circular connector) are both plugged in properly.
- Check the Emergency Stop is not operated – if it is operated, the remote control will be beeping – reset the Emergency Stop.
- Check that the hoist “engaged” mechanism (located on the side of the hoist itself) is set to the “normal” position, and not set to freewheel.
- Check the battery connections. When the Cable Fox hoist operates, it draws many amps. A loose bolt connection or a badly crimped terminal will cause the voltage to drop under load and the hoist may not operate.
- Check the plug in power connectors from the battery and also from the hoist – check that a terminal hasn't been dislodged in the housing – that the connections are mating properly.

The hoist has a thermal resetting fuse – if this fuse has tripped, then wait for 10 seconds and the hoist will start again.

- The hoist up direction is stopped automatically when the hoist is fully up – with a microswitch – check that this switch is operating properly and is not jammed, mechanically distorted or completely broken

7 Repair

KISTERS precision instruments and data loggers are produced in quality-controlled processes. All KISTERS production and assembly sites in Australia, New Zealand and Europe are ISO 9001 certified. All equipment is factory tested and/or factory calibrated before it is shipped to the client. This ensures that KISTERS products perform to their fullest capacity when delivered.

Despite KISTERS most rigorous quality assurance (QA), malfunction may occur within or outside of the warranty period. In rare cases, a product may not be delivered in accordance with your order.

In such cases KISTERS' return and repair policy applies. For you as a customer, this means the following:

- Contact KISTERS using the Repair Request Form and the Declaration of Contamination made available online:

Region (Language)	Download Link
Asia-Pacific (English)	Repair Request Form (APAC) Declaration of Contamination (APAC)
Europe, the Middle East and Africa (English)	Repair Request Form (EMEA) Declaration of Contamination (EMEA)
Germany (German)	Repair Request Form (DE) Declaration of Contamination (DE)

In response you will receive a reference number that must be referenced on all further correspondence and on the freight documents accompanying your return shipment.

- Please provide as much information and/or clear instructions within the return paperwork. This will assist our test engineers with their diagnosis.
- Please do not ship the goods prior to obtaining the reference number. KISTERS will not reject any equipment that arrives without reference number; however, it may take us longer to process.

Custom requirements for items sent to KISTERS for warranty or non-warranty repairs: Check with your national customs/tax authorities for details, processes and paperwork regarding tax exempt return of products. Typically, special custom tariff codes are available (such as HS Code = 9802.00) that verify the item is being returned for repair and has no commercial value. Please note that the customs invoice / dispatch documents should also clearly state: "Goods being returned to manufacturer for repair – No Commercial value". It is mandatory to have any returned goods accompanied by a commercial invoice on headed paper. KISTERS reserves the right to charge the customer for time spent rectifying incorrect customs documents.

Note: Please ensure that your goods are packed carefully and securely. Damage that occurs during transit is not covered by our warranty and may be chargeable.

8 Technical Data

Cable Fox Carriage

Main Construction	Body	Powder Coated Construction Grade Aluminium
Motor		Geared Motor 320 W
Speed		0 m/s to 0.6 m/s (2 ft/s)
Distance Measurement		0.01 m (0.01 ft) Resolution
CFX Carriage Battery		Shared battery with the CFX Hoist (see CFX Hoist Battery specifications)

Cable Fox Hoist

Min. Lifting Capacity	10 kg (22 lbs)
Max. Lifting Capacity	50 kg (110 lbs)
CFX Hoist Battery	Sealed Lead Acid (SLA) 12 V dc, 18 Ah up to max. holding capacity 21 Ah (maximum allowable dimensions H × W × D: 180 × 181 × 80 mm) Preferred brands: Power Sonic, FIAMM, Panasonic, Victron. For example, Victron AGM Deep Cycle 12 V 22 Ah. Note: 12 V battery and battery charger to suit sealed lead acid batteries are not supplied.
Housing	Powder Coated Construction Grade Aluminium
Rope	Synthetic Rope 4 mm diameter, 15 m long
Safety Switch 1	Automatic stop when reaching the end of the rope (End of Raise)
Safety Switch 2	Automatic stop when reaching 4 layers before end of the rope on the drum (End of Lower)
Operating Temperature	-29 °C to +49 °C
Buzzer	An audible alarm can be activated via the remote control to alert field personnel when the Traveller is in motion.

Breakaway Kit

Main Construction	Body	Stainless Steel
Break Load Capacity		182 kg (400 lbs)

Wireless Remote Control

Controls	▪ Raise / Lower Control + Battery Voltage monitoring
----------	--

	▪ Forward / Reverse + Speed control ▪ Emergency Stop
LCD	▪ 16 characters × 2 lines with backlighting ▪ Displays horizontal distance, voltages, current, radio signal strength and alarm conditions.
Radio Frequency	Frequency Hopping Spread Spectrum (Jumps to a new frequency every 400 ms) ▪ EU Version 863.05 MHz to 869.95 MHz (70 Freq) ▪ US Version 902.971 MHz to 926.653 MHz (64 Freq) Note: Previous model operated on a fixed selectable frequency. ▪ USA 902.5 to 914.5 MHz (1 MHz spacing) ▪ AUS 915.5 to 927.5 MHz (1 MHz spacing) ▪ Operating Range 400 m (1300 ft) line of sight
Indicators	▪ LEDs for comms and fault indication ▪ Sounder for low battery
Power Source	▪ 3 × AA NiMh 2300 mAh batteries with built-in charger ▪ (3 × AA Alkaline batteries in an emergency)

9 Obligations of the Operator and Disposal

This chapter contains the following subsections:

- [Obligations of the Operator](#) ⁴⁰
- [Dismantling / Disposal](#) ⁴⁰

9.1 Obligations of the Operator

European Union

In the Single European Market it is the responsibility of the operator to ensure that the following legal regulations are observed and complied with: national implementation of the framework directive (89/391/EEC) and the associated individual directives, in particular 2009/104/EC, on minimum safety and health requirements for the use of work equipment by employees at work.

Worldwide

Regulations: If and where required, operating licences must be obtained by the operator. In addition, national or regional environmental protection requirements must be complied with, regardless of local legal provisions regarding the following topics:

- Occupational safety
- Product disposal

Connections: Local regulations for electrical installation and connections must be observed.

9.2 Dismantling / Disposal

When disposing of the units and their accessories, the applicable local regulations regarding environment, disposal and occupational safety must be observed.

Before dismantling

- Electrical Devices:
 - Switch off the units.
 - Disconnect electrical appliances from the power supply, regardless of whether the appliances are connected to the mains or to another power source.
- Mechanical devices:
 - Fix all loose components. Prevent the device from moving independently or unintentionally.
 - Loosen mechanical fastenings: Please note that appliances can be heavy and that loosening the fastenings may cause them to become mechanically unstable.

Disposal

Operators of old appliances must recycle them separately from unsorted municipal waste. This applies in particular to electrical waste and old electronic equipment.

Electrical waste and electronic equipment must not be disposed of as household waste!

Instead, these old appliances must be collected separately and disposed of via the local collection and return systems.

Integrated or provided batteries and accumulators must be separated from the appliances and disposed of at the designated

collection point. At the end of its service life, the lithium-ion battery must be disposed of according to legal provisions.

EU WEEE Directive

As players in the environmental market, KISTERS AG is committed to supporting efforts to avoid and recycle waste. Please consider:

- Avoidance before recycling!
- Recycling before disposal!



This symbol  indicates that the scrapping of the unit must be carried out in accordance with Directive 2012/19/EU. Please observe the local implementation of the directive and any accompanying or supplementary laws and regulations.

10 Appendices

This chapter contains the following subsections:

- [Cable Fox Dimensions](#)^[42]
- [Breakaway Kit](#)^[43]

10.1 Cable Fox Dimensions

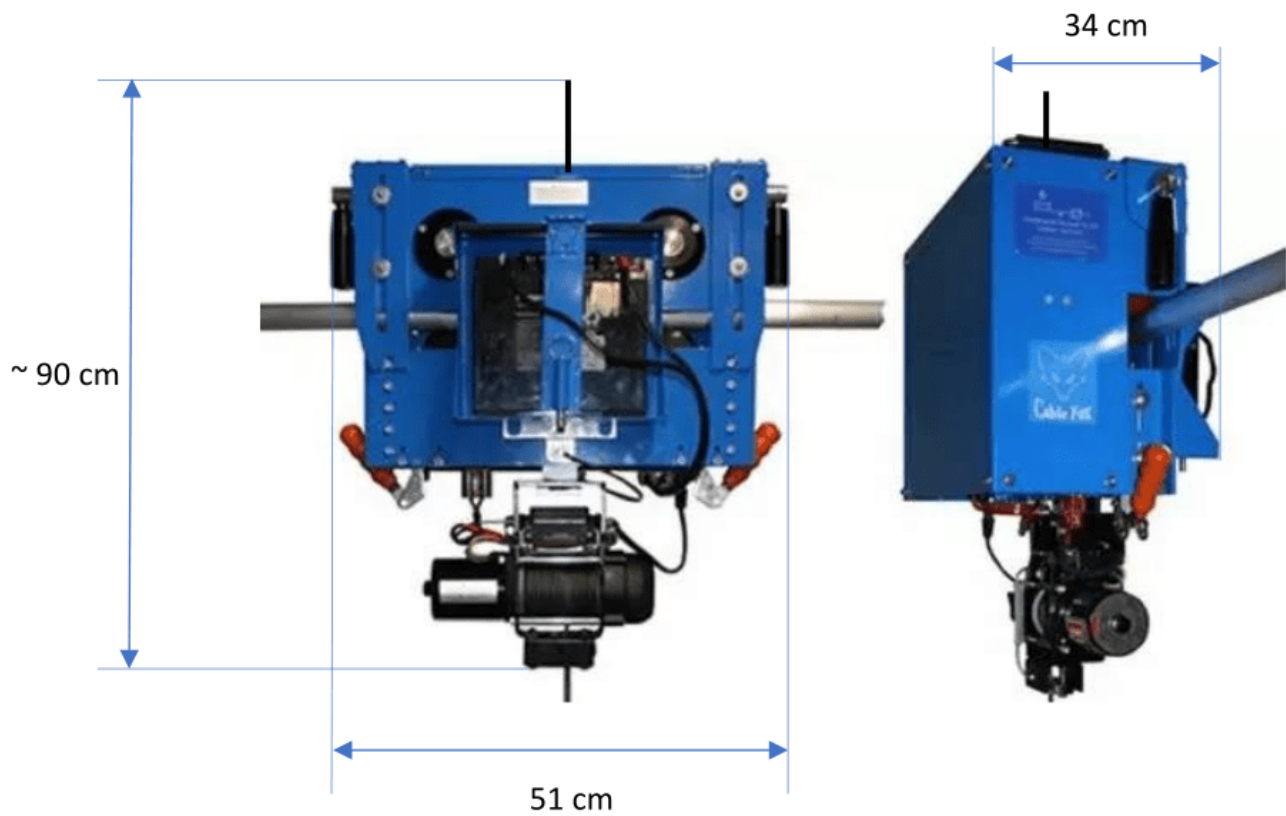


Figure 8 – Complete size of the system (hoist + antenna + battery holder attached)

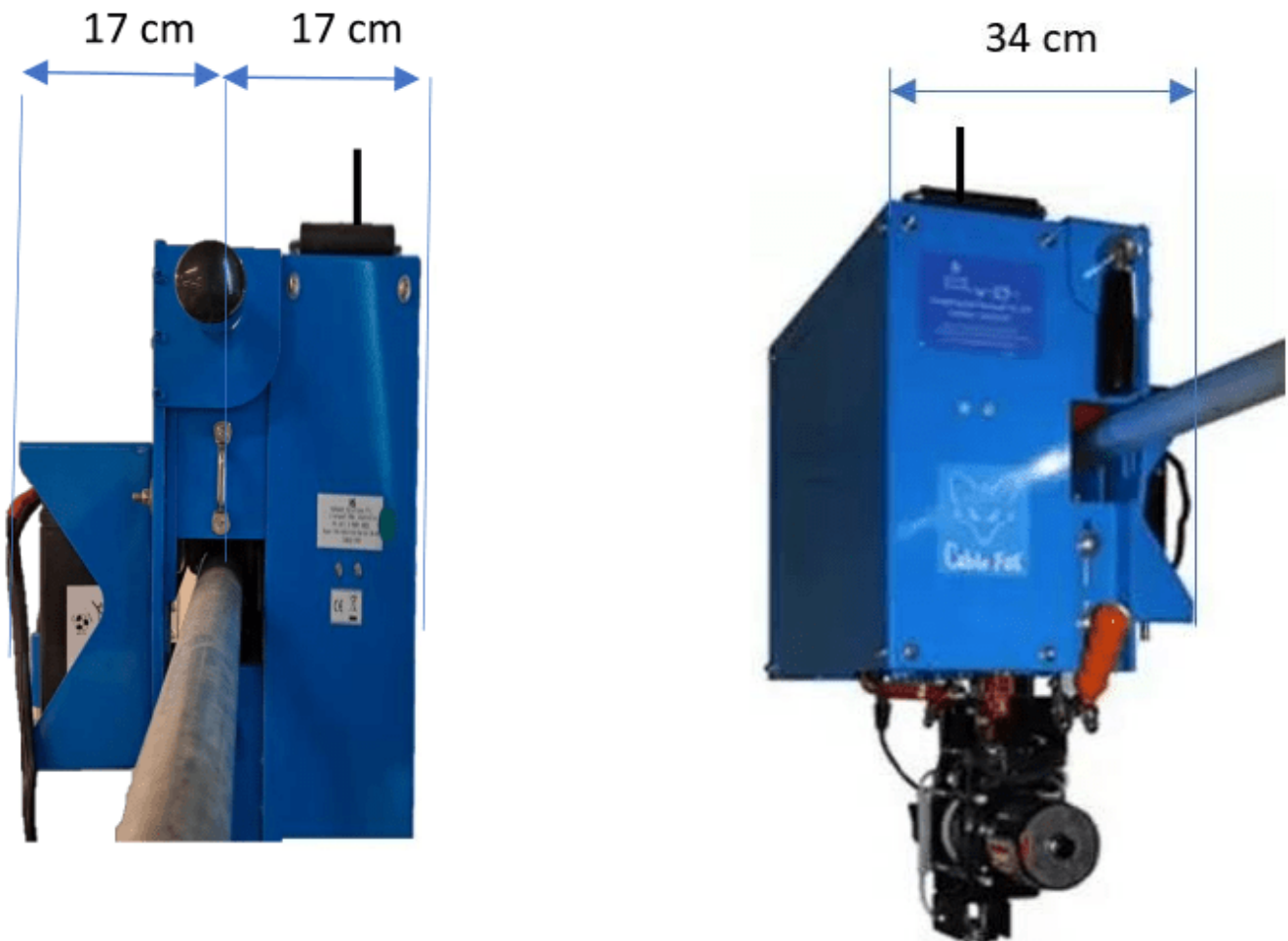


Figure 9 – Complete size of the system (hoist + antenna + battery holder attached)

10.2 Breakaway Kit

This chapter contains the following subsections:

- [Introduction](#)⁴³
- [Installation](#)⁴⁵
- [Operation](#)⁴⁹

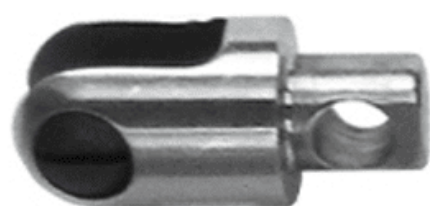
10.2.1 Introduction

KISTERS provides a Breakaway Kit with its Cableway Systems and Winches as a safety precaution against large debris causing damage or injury during a flood situation. The Break-Away Swivels provide an inexpensive fracture point between a pulling line and a water flow sensor to avoid an expensive cableway structure from getting damaged or a human dragged into the water when gauging using a winch board or a bridge crane from the side of a bridge.

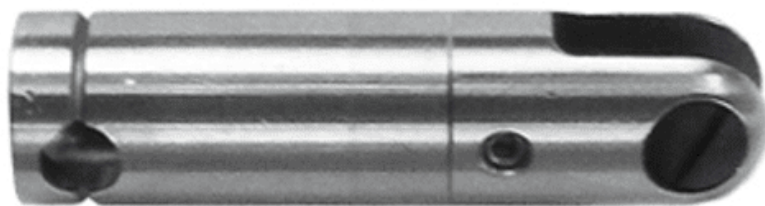
Retaining Rings (Circlips)



Break-Away Pin



Clevis End



Swivel Body

The Break-Away Swivel is used with the following KISTERS products:

1. The Hornet & the Hornet Plus (Series 2)
2. The Cable fox models:
 - CFX/S2/1014-H
 - CFX/S2/1014-H-EU
 - CFX/S2/1014-H-US
 - CFX/S2/1632-H
 - CFX/S2/1632-H-EU
 - CFX/S2/1632-H-US
3. Single Drum Winches Models:
 - WS250
 - WS400
 - WS500
 - WS700
 - WS1000 (Product coming soon)
4. Double Drum Winches Models:
 - DDT700
 - DDT1000

The table below shows the Break-Away load, Break-Away body and the pin required.

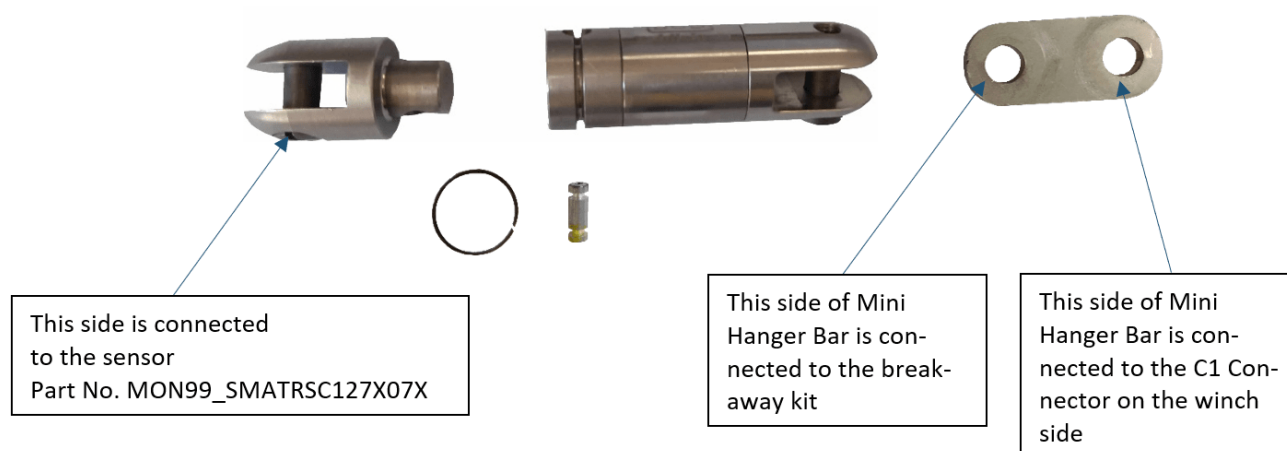
Model	Break-Away Load (kg)	Break-Away Part No.	Break-Away Pin Part No.	Colour Code	Number of Pins supplied
Hornet	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
Hornet Plus	272	MON99_SMATRSC127X04X	MON99_SMATRSC127X05X	Orange	5
CFX/S2/1014-H	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
CFX/S2/1014-H-EU	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
CFX/S2/1014-H-US	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5

Model	Break-Away Load (kg)	Break-Away Part No.	Break-Away Pin Part No.	Colour Code	Number of Pins supplied
CFX/S2/1632-H	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
CFX/S2/1632-H-EU	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
CFX/S2/1632-H-US	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
WS250	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
WS400	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
WS500	182	MON99_SMATRSC127X04X	MON99_SMATRSC127X06X	Yellow	5
WS700	272	MON99_SMATRSC127X04X	MON99_SMATRSC127X05X	Orange	5
WS1000 (Product coming soon)	272	MON99_SMATRSC127X04X	MON99_SMATRSC127X05X	Orange	5
DDT700	272	MON99_SMATRSC127X04X	MON99_SMATRSC127X05X	Orange	5
DDT1000	272	MON99_SMATRSC127X04X	MON99_SMATRSC127X05X	Orange	5

10.2.2 Installation

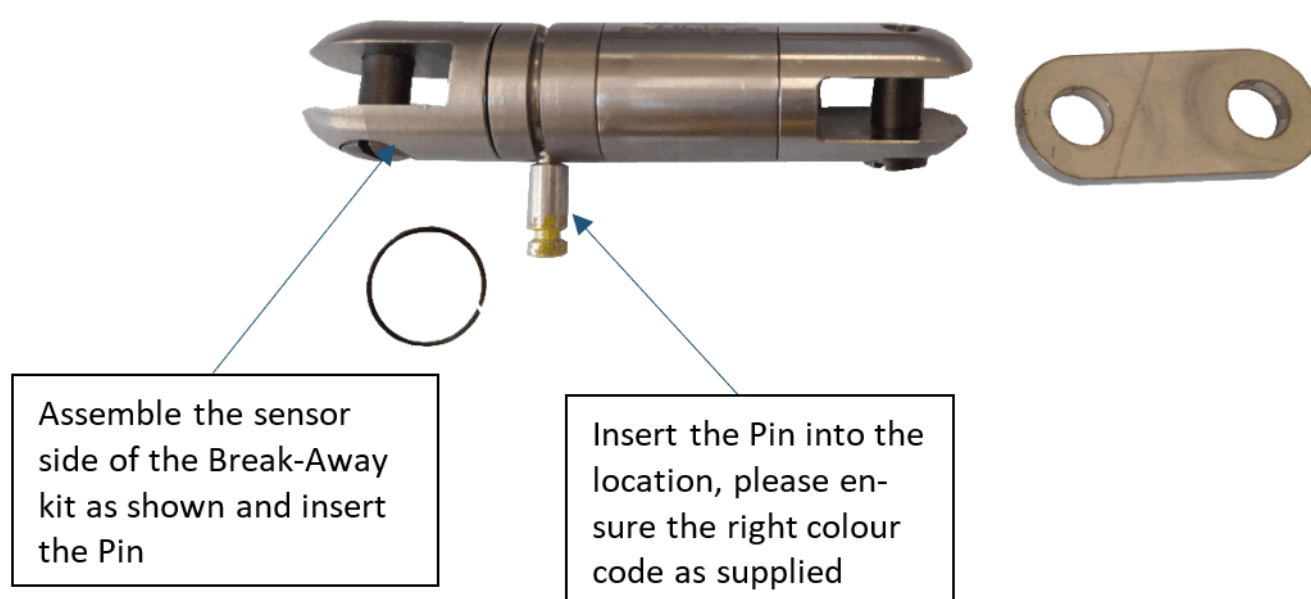
The Breakaway Kit assembly is very straight forward, however attention needs to be made to the fine detail explained below for the Breakaway Kit to perform as required using the specific load designated for it.

Step 1



Note: In a situation where the Break-Away is released, and the sensor is detached and lost, only the small section of the Breakaway Kit has to be reordered. Part No. MON99_SMATRSC127X07X.

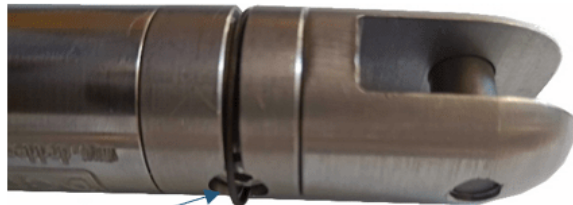
Step 2



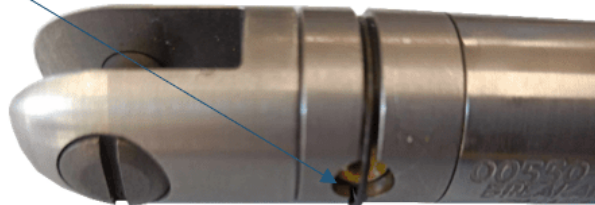
Step 3



Assemble the circlip
to hold the Pin in place



Ensure the Pin is central



It is essential to have the pin located in the center position as shown above for the Break-Away to activate at the load specified. Failure to do so will result in the Break-Away activating at a higher load.

Step 4



Undo the Pin to Assemble
the Mini Hanger Bar to
the Break-Away kit



Redo the Pin and secure
the Mini Hanger Bar

Note: The Break-Away Assembly is complete and ready to attach between the C1 connector (Winch) and the Sensor (The Stabilising Weight or Gauging Weight Hanger Bar on the sensor side).

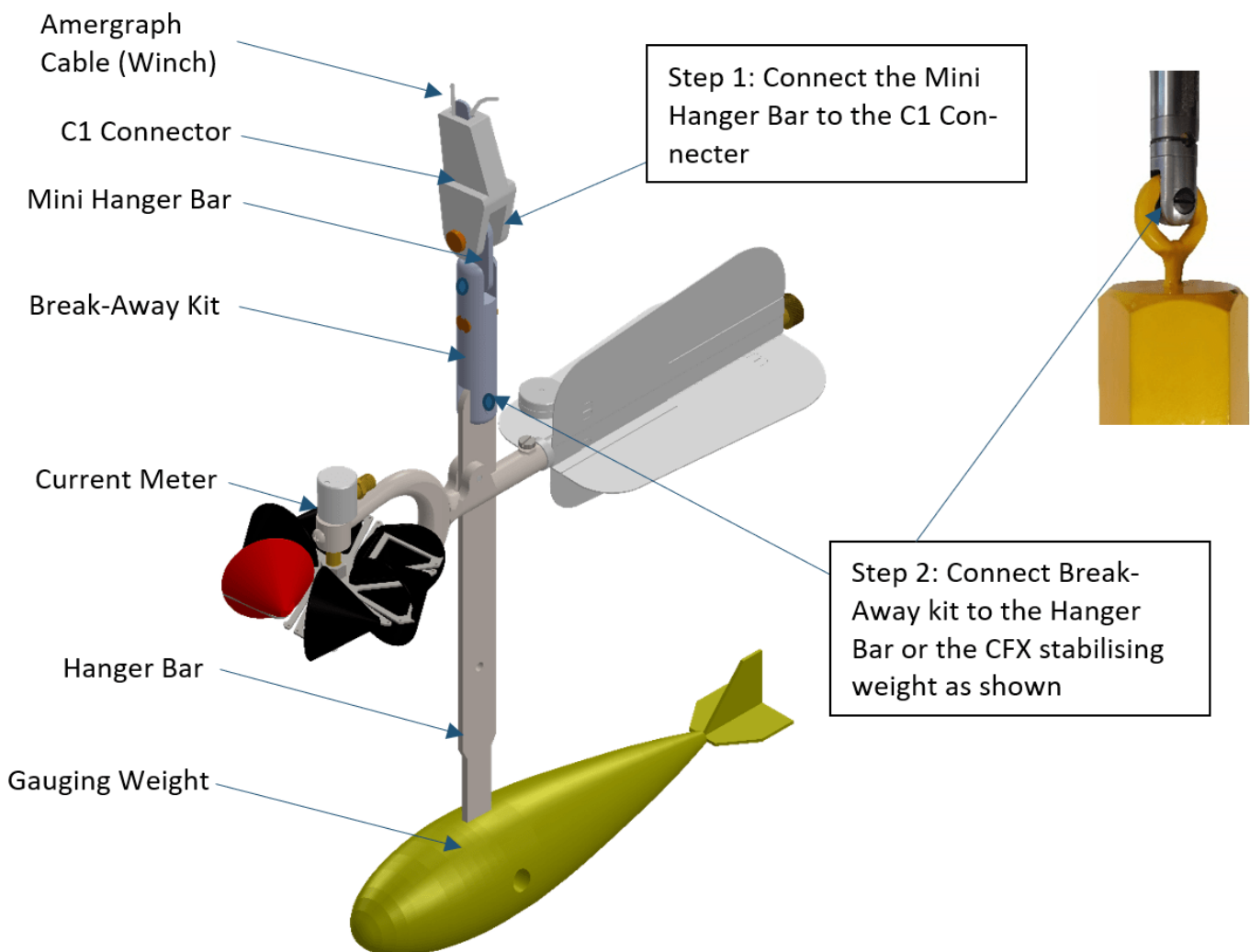
10.2.3 Operation

It is essential to check the pin before using the Break-Away device, specially if the pin is used several times for gauging. Few safety precautions a user should take into consideration when using a Breakaway Kit which are listed below:



- Visually inspect the pin for any marks or cracks if used more than once.
- In a situation when the gauging was in extremely rough water and the pin did not fail, it is advisable not to reuse the pin as the chance of failure will be higher due to fatigue. Please note the Break-Away device and sensor is more expensive than the pin itself.
- When using the Breakaway Kit make sure you are wearing safety shoes and avoid having your feet directly under the gauging weight.
- When gauging, personnel should not move or stand directly below the gauging equipment.

After inspection, install the Breakaway Kit as shown below:



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