E-fish

500W Electro-Fishing Backpack System

User Manual

CONTENTS

1. INTRODUCTION

Thank you for purchasing this 500W electro-fishing backpack system from E-Fish.

We hope you get many years of trouble free use from your backpack. However, should you have any difficulties please refer to the "Problems & Support" section at the end of this manual (page55) for details on how to obtain support, servicing, replacement parts and repairs.

Throughout this document, the following symbols are used to indicate special precautions or procedures that you should take note of.

WARNING!
This symbol indicates a warning you should follow of to avoid bodily injury and damage to your equipment.

CAUTION
This symbol denotes precautions and procedures you should follow to avoid damage to your equipment or injury to the operators.

NOTE
This symbol denotes special instructions or tips that should help you get the best performance from your fishing system.

1.1. What Is Electro-Fishing?

Electric fishing (or electro-fishing) has been proven to be a highly efficient and essential technique for monitoring fish populations in rivers and lakes, and performing rescue and relocation work of fish stocks.

Electro-fishing is the process of catching fish by creating an electrical-field through water, around an anode (on a hand held pole) and cathode (trailing in the water behind the operator). This electric-field develops a voltage along the length of fish exposed to it, such that 'galvanotaxis' stimulates their nervous system, and they are forced to swim towards anode (the source of the field).
At a point approaching the source of the field, the fish enters the hold-zone, where the field is then of sufficient strength to temporarily immobilise them and thus aid in their capture.

Three main categories of electro-fishing equipment exist…

- Backpack machines
- Bank-side machines
- Boat mounted machines

Your electro-fishing system is a backpack machine that is suitable for use by operators wading in shallow streams and rivers, and the margins of still water.

1.2. What Are The Hazards Of Electro-Fishing?

Due to the use of high-voltage electric fields in the presence of water, electro-fishing is a potentially hazardous activity, for both the operator and surrounding personnel, unless correct safety and operational guidelines are observed.

The "Safety Considerations" section on page 8 discusses the potential hazards
These are discussed in further detail in subsequent sections of this documentation.

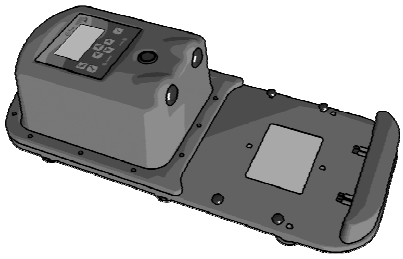
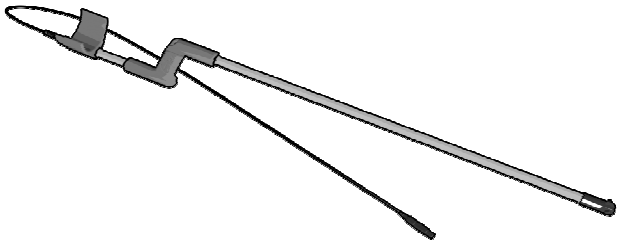
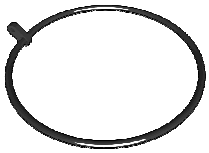
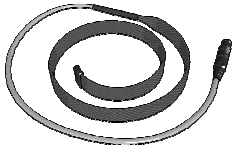
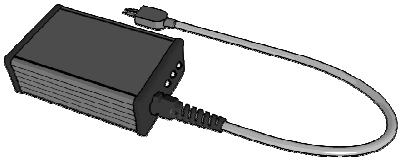
1.3. Where Can I Electro-Fish?

Many countries impose legal restrictions, legislation and regulations on the use of electro-fishing techniques. Before using your fishing system you should always check with the government agency that has overall responsibilities for regulating fisheries in your geographical location.

- In the England and Wales, further information should be obtained from the Environment Agency (see www.environment-agency.gov.uk).
- In Scotland, further information should be obtained from the Scottish Environment Protection Agency (see www.spea.org.uk).
- In Northern Ireland, further information should be obtained from the Northern Ireland Environment Agency (see www.ni-environment.gov.uk).

2. SYSTEM CONTENTS

Before proceeding, please check that your fishing system contains the following items…

	Part Number
• Backpack & Harness 	EF00163
• Anode Pole 	EF00167
• Anode Electrode Ring (300mm) 	EF00134
• Cathode Wire (1m) 	EF00168
• Battery Pack, 7.5Ah or 3.3Ah 	EF00164 or EF00165
• Battery Charger & Mains Lead 	EF00166
• Transit Case	EF00170
• Documentation	EF00169
• Laminated Quick Start Guide	EF00171
• Maintenance Pack	EF00172

If you have already read this manual and are familiar with the system's operation and safety practices, you may want to refer to the accompanying laminated "Quick Start Guide" when deploying the system in the field or providing staff operation and safety briefings.
Additional copies of the "Quick Start Guide" are available from E-Fish Sales.

3. SAFETY CONSIDERATIONS

The nature of the high-voltage electric fields in the presence of water makes electro-fishing a potentially hazardous activity for both the operator, and assistants.
As such, close attention must paid to operating procedures, user training and safety, so before proceeding we strongly recommend that you read all the safety, deployment and operation guidelines in this document, and take these into consideration along with your organisations own safety policies.

Whist this document intends to educate and inform you of the main potential hazards and requirements of electro-fishing, it is not intended as a comprehensive reference, and as such the primary responsibility for safety, training and operating of the equipment must lie with the owner and users of the equipment.

Please note that neither E-Fish (UK) Limited or their affiliates shall be liable to the purchaser of this product, or third parties, for losses, costs, damages or expenses incurred by the purchaser or third parties as a result of accident, misuse, abuse, modification of this product or a failure to strictly comply with the operating and maintenance instructions.

Before discussing the backpack machine and fishing practices in detail, we feel it is important to first review the basic legislation and safety practices that apply to electro-fishing…

3.1. Legislation

Before attempting to use your fishing machine, you should familiarise yourself with legislative regulations listed below, that apply to the use of your backpack fishing system, and ensure that all requirements have been met by your operational procedures…

- Health & Safety at Work Act 1974.
- Electricity at Work Regulations 1989.
- Provision and Use of Work Equipment Regulations 1998.
- Manual Handling Operations Regulation 1992.
- Management of Health and Safety at Work Regulations 1999.

The "Health & Safety at Work Act 1974" places an obligation on employers to establish specific requirements for the employees, including…

- Safe systems of work
- Safe equipment to work with
- Sufficient training and information to enable them to perform their duties without risk to themselves and others who may be affected by the work being done.

The "Electricity at Work Regulations 1989" includes electro-fishing activities under the category of "working near live conductors". Therefore, this act requires that suitable precautions are taken to prevent injury, and place a duty on the employer to ensure that every work activity is carried out in such a manner as not to give rise to danger. The employee also has a duty to co-operate with the employer so that safe systems of work are properly implemented.

You should also check that you have obtained any necessary permits required by law from the relevant government department or agency to cover the area you are working in.

3.2. Personnel

Everyone using or working in the presence of electro-fishing apparatus must recognise that it is potentially dangerous activity and the equipment can be hazardous if used incorrectly.

Electro-fishing work should never be undertaken by any single person! Should accident or injury occur, there should always someone else present to isolate equipment, perform first aid, and summon medical assistance if required.

Staff should be screened and selected to be fit for the task they are being asked to carry out. It is recommended that no person shall take part in electro-fishing operations until…

- The have learnt the basic theory of how electro-fishing works.
- The operational instructions and procedures of electro-fishing have been fully explained to them.
- A competent and experienced officer on site has instructed them on the safe working procedures described in this documentation.
- They comply with the appropriate generic Health & Safety instructions for all staff and field workers.

Additionally personnel involved in electric-fishing activities should have…

- Learnt how to administer artificial respiration and deal with the results of electric shock.
- Received Working in Water training.
- Consulted a doctor or occupational health advisor if they have a significant medical condition (such as heart or respiratory problems, diabetes or epilepsy), to discuss the implications to their health.

3.3. Electrical Hazards

Electrical shocks may cause burns, uncontrolled muscular spasms, ventricular fibrillation (heart attacks) or neurological effects, with pulsed electric currents as low as 1mA across the heart for a fraction of a second being potentially fatal.

The main sources of potential risk of electric shock during electro-fishing operations are…

- Bodily contact with the energised electrodes,
- Bodily contact with water within the radius of the electric field,
- Shocks from damaged or poorly maintained equipment.

To minimise the risk of electric shock, suitable protective insulating clothing should be worn (discussed in later sections), and regular inspection, maintenance and servicing should be performed on the equipment. Damaged equipment should not be used.

Additionally, observe the following precautions…

- Do not allow unprotected parts of the body to come into contact with the water when electro-fishing is in progress.
- Only the operator of the backpack and anode should remove debris from the electrode, when they are sure the system is de-energised, with the "Stop" button locked in position.
- Do not simultaneously use more than one set of electro-fishing equipment at one site.
- Ensure the anode ring (electrode) is fully submerged while the fishing system is active.
- Do not use electrode rings as dip nets.
- Do not use the equipment if any of the housings or cables appear damaged or compromised for the ingress of water, or electrical conductors are exposed on external wires.
- Do not use any mains appliances in the presence of water (battery chargers, etc.).

3.4. Operational Hazards

Other hazards that may be present during electro-fishing activities include…

- **Drowning** – when working near water there is always a risk of drowning. Suitable precautions should be taken, such as wearing a life jacket.
- **Tripping and Falling** – The presence of cables in the water, bank side vegetation, and the slippery nature of river beds present a hazard to the operator. To minimise risk, suitable protective clothing should be worn, cabling in the water should be minimised, and loose protruding cabling should be tidied and managed to prevent snagging on tree branches etc.
- **Fire** – All high-power electrical equipment will produce heat, which under extreme fault conditions could present a danger of fire. You should recognise this danger and take suitable precautions.
- **Manual Handling** – Injuries can occur if heavy equipment is not properly handled. The incorrect use of any equipment may result in minor cuts, bruises, or grazes.
- **Spectators and Animals** – If fishing activity is likely to attract spectators, they should be kept away from the water and equipment. Suitable temporary warning signs should be displayed (showing "Danger: Electric Fishing In Progress"). Stop fishing if people or livestock come within 5 metres of the electrodes.

Risk assessments of the field site and equipment used should be undertaken before any fishing activities occur, and suitable methods of communication for use in emergency situations should be ensured.

3.5. Emergency & Accident Procedure

Before undertaking any fishing operations, you should develop and familiarise all users with an "Emergency Action Procedure". A typical action procedure may look something like…

Step	Action
1	**Assess The Environment** Before approaching any casualty, first assess whether it is safe to do so and you are not putting yourself or other at risk in attending the casualty.
2	**Shut Down The Equipment** If there is an accident, before you give assistance, immediately… • Active the "Emergency Stop" button on the backpack to isolate all power from the electrodes. • Switch off the electrodes.
3	**Administer First Aid** On attending the casualty, perform basic first aid procedures (the "ABC" of first aid!) • Check the casualty has a clear airway. • Check the casualty is breathing. • Check the casualty has circulation. • Make an assessment on what action to take…
4	**If the Casualty is Unconscious** • Start resuscitation if there is no pulse or the person is not breathing • Always seek immediate medical assistance. Any casualty who has been unconscious must be examined by a doctor as soon as possible, even if they appear to have recovered.
5	**If the Casualty has a Serious Injury** • Call for an ambulance by the quickest means, and obtain medical care. • In remote areas with difficult access, seek professional advice from the emergency services.
6	**For other Minor Injuries** • Apply first aid • Clean minor cuts, burns and abrasions, and cover with a waterproof dressing.
7	**Report Incidents** • Log and report all accidents in accordance with your employer's procedures. • Report any equipment damage or malfunctions to your employer, and seek advice, servicing or repair from the manufacturer (E-Fish (UK) Limited).

3.6. Other Precautions

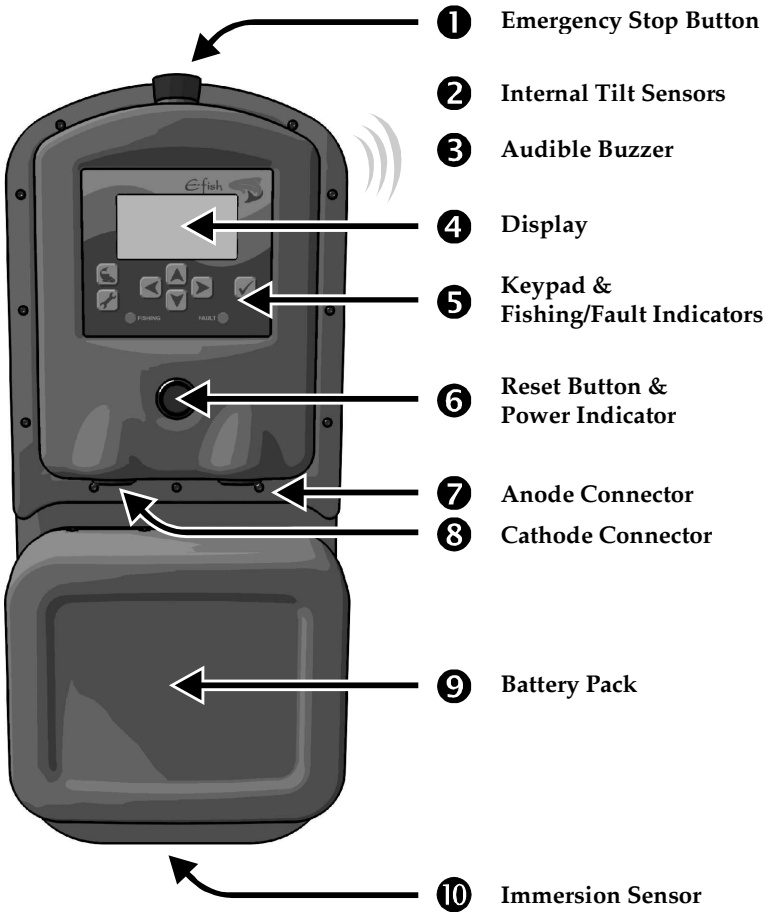
For storage and maintenance information, please refer to the section "Care Of Your Fishing System" (see page 52).

If your equipment is damaged or defective in any way, or if you have any safety or operational queries, please contact E-Fish Technical Support (see page 57).

4. PARTS OF THE FISHING SYSTEM

Before you start connecting or using your electro-fishing system, please familiarise yourself with the key features of the main system parts…

4.1. Backpack Features



❶ **Stop Button** – The prominent red Stop button, on top of the unit will mechanically isolate all the electrical outputs, and shut down power, immediately when activated. Once pressed, the unit cannot be restarted until the button has been twisted to release its mechanical latch.

For safety, it is recommended that the Stop button is pressed (and latched) whenever the unit is not in use. This will ensure all power is turned off and the unit cannot be accidentally activated.

❷ **Tilt Sensors** – For safety, inside the backpack control box a set of tilt sensors continuously monitor the orientation of the backpack. These will immediately shut down the fishing output should you trip or fall over while fishing and they will prevent fishing from starting until the backpack is in a vertical position.

❸ **Audible Buzzer** –The backpack control box contains a multi-tone audible buzzer. This will produce a variety of tones and pulses depending on the status of the system, and the

fishing settings in use.

A summary of all the audible tones produced by the backpack is detailed in "Audible Tones" on page 51.

❹ **Display** – The large graphical display provides an icon driven menu system that allows quick and easy adjustment to fishing settings, as well as displaying fishing status, error and warning messages.

❺ **Keypad & Fishing/Fault Indicators** – Below the display, the 7 buttons on the keypad allow you to navigate through the menu system, change parameters, store and recall fishing settings.
Below the keys, red and green indicators show…

- **Green "Fishing" Indicator** - When the trigger on the anode pole is activated, the green "Fishing" indicator will illuminate while the electrode is energised.
- **Red "Fault" Indicator** – If a problem occurs, or a safety sensor is activated (trip, immersion, temperature, etc.), the red "Fault" indicator will illuminate.

❻ **Reset Button & Power Indicator** – When you are ready to start fishing, press the Reset button to power up the system. If the Stop button is engaged, it must first be twisted to release the mechanical stop latch. When powered up, the Reset button will be illuminated in green.

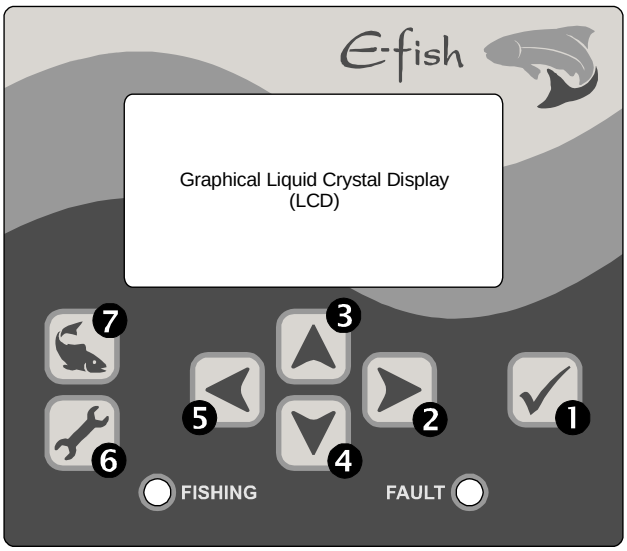
❼❽ **Anode & Cathode Connectors** – The Anode pole and Cathode wire are connected to the backpack via these connectors.

❾ **Battery Pack** – The removable battery pack system allows battery modules to be quickly and safely installed in the field.

❿ **Immersion Sensor** – At the bottom of the backpack, an optical immersion sensor detects if the surrounding water level is becoming too high, and for safety, will shut-down fishing when submerged.

4.2. Keypad Buttons

Configuration and control of the fishing system is achieved through the seven tactile buttons situated on the top control unit of the backpack.



The functions of the buttons are…

❶ 

Enter/Select Button – Use this button to confirm menu selections, accept changes made to parameters or clear on-screen status/error messages.

❷ ❸ ❹ ❺ 

Arrow Keys – Use these to navigate through the icon based function menus, or adjust the value of parameters (such as fishing voltage, duty cycle, frequency etc).

❻ 

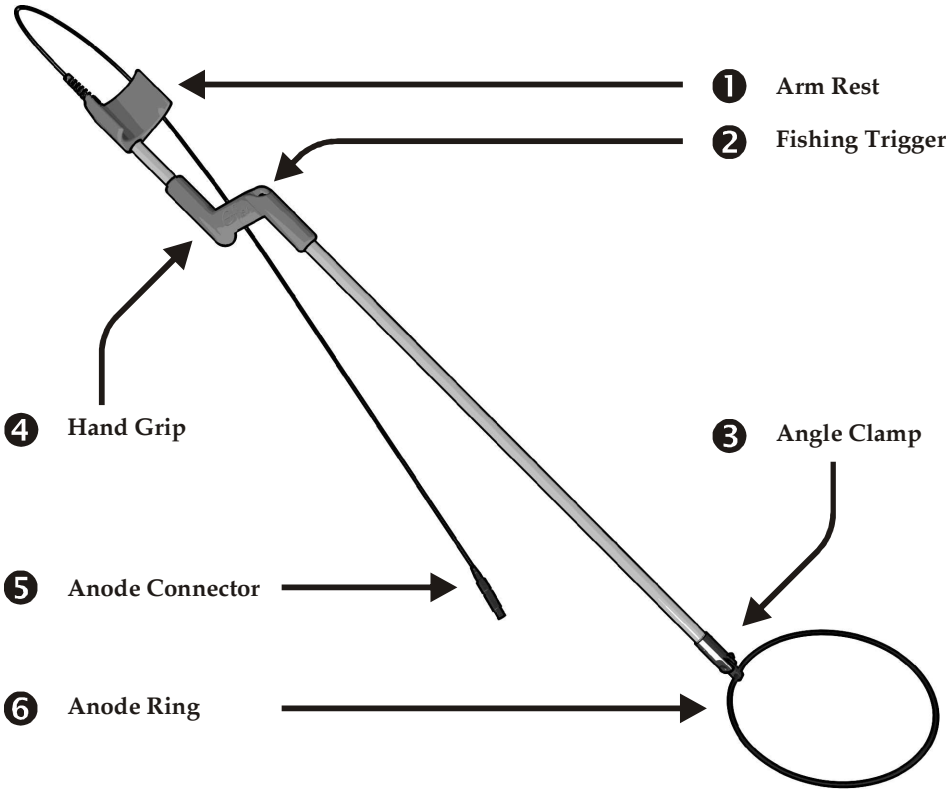
System Menu – Press this button to show the menu of system functions, that provides functions to store and recall settings, control the timer, perform diagnostic self-tests, etc.

❼ 

Fishing Menu– Press this button to show the menu that allows quick adjustment of the fishing parameters (voltage, duty cycle, frequency, etc).

A full explanation of all the items in menu is detailed in the "The User Interface" section from page 36 onwards.

4.3. Anode Features



❶ **Arm Rest** – When fishing, to avoid fatigue, the arm rest will help reduce stress on the operators wrist from the weight of the pole.

❷ **Fishing Trigger** – When the backpack is turned on, press the fishing trigger to apply the high-voltage electrical field to the water (between the anode ring and cathode wire).

To reduce risk of injury, never press the fishing trigger unless the anode ring is fully submerged.

❸ **Angle Clamp** – The angle clamp allows the angle of the anode ring, relative to the angle pole, to be adjusted. The anode ring should be horizontal when the anode pole is help by the operator at a comfortable angle.

When the Fishing Trigger is pressed, the angle clamp bracket will become live. Never attempt to adjust the angle clamp with the anode pole connected to the backpack.

❹ **Hand Grip** – Place your hand around the grip and use your thumb to press the Fishing Trigger.

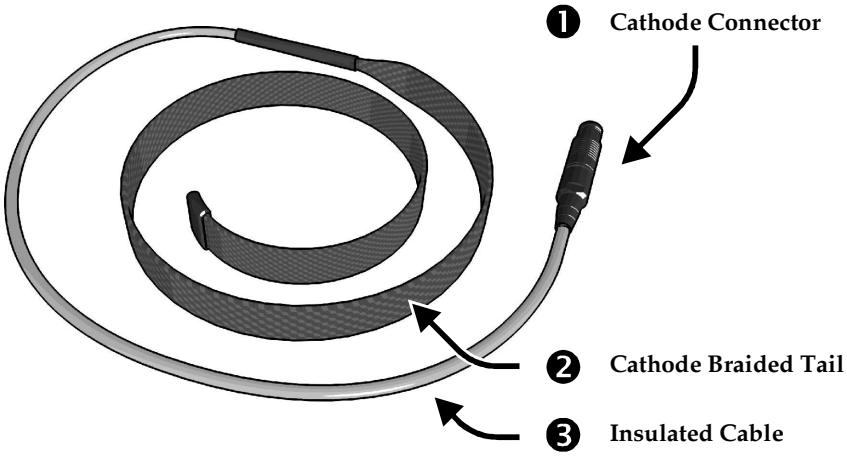
❺ **Anode Connector** – The anode connector plugs into the labelled anode socket on the backpack.
The anode plug has a different pin configuration to the cathode preventing connection to the wrong socket on the backpack, however do not attempt to force the plug into place,

and ensure both the plug and socket are free from dirt and water before connecting.
When mated the anode plug will lock into place; to disconnect, pull back the plug's silver body to release the latch.
Do not attempt to pull the yellow cable directly to disconnect the anode.

❻ **Anode Ring** – Different sizes of anode rings are available to suit different fishing conditions and achieve the best electric field intensity. As standard, a 300mm ring is supplied with the anode pole.

Do not fit a dip net or any other equipment onto the anode ring. Only the operator should attempt to clear any debris from the anode ring when the unit is switched off.

4.4. Cathode Features



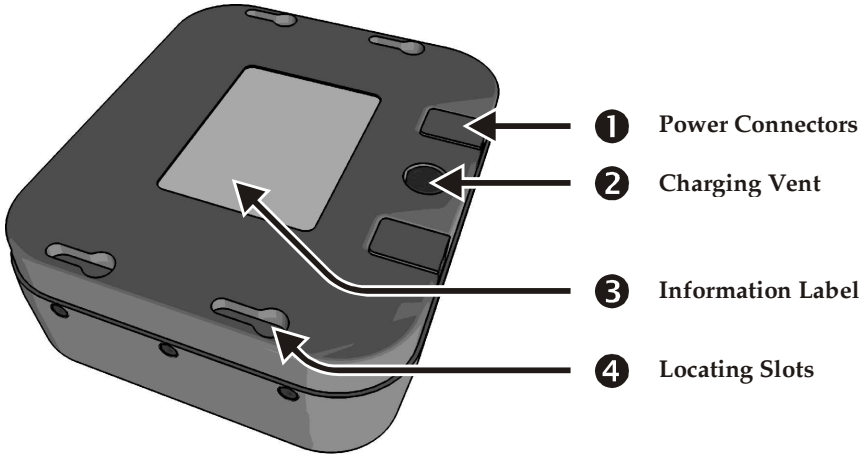
❶ **Cathode Connector** – The cathode connector plugs into the labelled cathode socket on the backpack.
The cathode plug has a different pin configuration to the anode preventing connection to the wrong socket on the backpack, however do not attempt to force the plug into place, and ensure both the plug and socket are free from dirt and water before connecting.
When mated the anode plug will lock into place; to disconnect, pull back the plug's silver body to release the latch.
Do not attempt to pull the yellow cable directly to disconnect the cathode.

❷ **Cathode Braided Tail** – The cathode tail is made from a tinned braided copper wire. When fishing, the tail should be fully submerged in the water and be towed by the user as they walk through the water.

❸ **Insulated Cable** – The insulated cable does not need to be submerged in normal use.

4.5. Battery Pack Features

Several size variants of battery pack are available, however all modules have the following features…



❶ **Power Connectors** – When the battery pack is connected to the backpack, the power connector sockets will align and mate with corresponding plugs on the backpack battery connector, forming a waterproof connection.
If the battery pack is difficult to connect to the backpack, smear a little silicone grease (supplied with the system) onto the rubber parts of the backpack plugs (not the battery pack sockets!). Avoid getting grease on the electrical contacts, and never force the battery pack into position as this may cause damage.

Both the power connector sockets are connected together and fused internally. When charging, the battery charger only need to be connected to one of the power connectors (it does not matter which).
Do not insert any other item into either of the power connector contacts.

❷ **Charging Vent** – As the battery pack contains lead-acid batteries, some hydrogen gas may be produced during charging. The vent uses a special material that prevents water entering the battery pack, but allows excess hydrogen gas to escape.

Always ensure that the battery pack is charged in a well ventilated area, to ensure that there is no build up of hydrogen gas in the atmosphere.

❸ **Information Label** – This label contains information relating to the size, weight and manufacturing date of the battery pack.

❹ **Locating Slots** – When connecting the battery pack to the backpack, the large holes at the end of the four locating slots should fit over the corresponding metal pegs on the backpack. Then, when the battery pack is flat on the backpack plate, it should slide easily downwards, mating the power connectors and locking the pack in place.

Your backpack fishing system uses 24V lead-acid battery packs and a smart 24V charger unit. Two types of battery pack are available from E-Fish…

- 7.5 Amp-hour — This battery pack weighs approximately 5kg, and will provide **50 to 60 minutes** of continuous fishing when delivering 150 Watts.
  When discharged, this battery will take between **6 and 7 hours** to fully charge using the E-Fish charger.

- 3.3 Amp-hour — This battery pack weighs approximately 2.6kg, and will provide **25 to 30 minutes** of continuous fishing when delivering 150 Watts.
  When discharged, this battery will take between **3 and 4 hours** to fully charge using the E-Fish charger.

Please note…

- The battery pack contains long-life heavy-use valve-regulated lead-acid cells. To get maximum battery life, ensure that the battery pack has been fully charged after each use and before long periods of storage, and every 6 months if in storage.
- For shipping purposes, the cells used in the battery pack are designated as "non-spillable". Before shipping batteries you should always check the specific rules and regulations for your shipping method and location with your courier, but in general the following markings are normally applicable…

  NON-SPILLABLE BATTERY

  Air Transport: Not restricted as per special provision A67

  Road Transport: Not restricted as per special provision 238

  Sea Transport: Not restricted as per special provision 238

Over time, and with use, the ability of the batteries to hold their charge will diminish. At the end of their life, E-Fish offers a recycling & reconditioning service, where the batteries within the pack house are replaced. Please contact E-Fish for further details of this service.

5. FISHING THEORY & SETTINGS

When undertaking electro-fishing activities your ultimate goal is to generate an electric field in the water that will attract and temporarily immobilise the fish within it, but with minimum distress and no long-term harm to them.

To achieve this you will need control the properties of the electric-field by choosing suitable backpack fishing settings (such as voltage, duty-cycle and frequency) that are based on the environmental conditions you are operating in, the type of activity your are undertaking and the fish species you are likely to encounter.

With experience you will find that it becomes easier to understand the effect of these settings, and make suitable and effective selections for the control parameters, but initially the following guidelines are provided to help you understand some of the theory behind electro-fishing.

The adjustment of backpack settings is covered in detail in the section "Configuring The Fishing Settings" on page 40.

If you are ever in doubt over any the value to use for a fishing setting, you should always start with the lowest value and gradually increase it until the desired fishing effect is observed.

In general, the recommended setup procedure for electro-fishing is (further in-depth explanations of each parameter follow this section)…

1. Check the water temperature, and do not fish in excessively hot water.
   - 16°C to 18°C for salmonids.
   - 22°C to 24°C for coarse fish especially when pike and perch are present.

2. Measure the water conductivity and use this to determine the appropriate starting "Voltage" setting. If you don't have a water conductivity meter, then choose about 150V as a starting point, or if in doubt choose an even lower voltage.

Water Conductivity	Recommended Voltage Adjustment Range	Recommended Duty-Cycle Adjustment Range
<150 µS/cm	250V – 300V 300V – 400V	10% 10% or DC (100%)
150 µS/cm – 500 µS/cm	200V – 250V 250V – 300V	10% – 20% 10% – 20% or DC (100%)
500 µS/cm – 800 µS/cm	150V – 200V	10% – 30%
800 µS/cm – 1000 µS/cm	120V – 180V	10% – 40%
>1000 µS/cm	100V – 150V	10% – 50%

3. Choose your Duty-Cycle mode based on the water conductivity and above table.
   - DC (100%) has better attraction and welfare properties, and is more effective in low-conductivity water. However, it is power hungry and will reduce fishing duration from a battery pack.

- Pulsed (10% to 50%) has better immobilisation properties and is more effective in higher conductivity water.

If in doubt, use DC where practicable or choose the 10% duty-cycle setting and work upwards during fishing.

4. Choose the Frequency based on the fish type being sought.

Fish Type	Recommended Frequency Range (Hz)
Salmonids	40Hz – 60Hz
Cyprinids	30Hz –50Hz
Percids	10Hz –40Hz
Pike	30Hz –50Hz
Eel	10Hz –40Hz
Other	10Hz –60Hz

5.1. Water Conductivity

Knowledge of water conductivity is a very useful prerequisite for successful and safe electro-fishing. It is recommended that reliable portable conductivity meter is included as an integral part of the survey equipment list.

Before setting up your fishing system at a new site, measuring the conductance of the water you will be working in will help determine the initial fishing settings to use. The electrical conductivity is a measure of the waters ability to conduct an electrical current, and its value is usually expressed micro-siemens per centimetre (µS/cm).

Water conductivities can vary considerably between locations. Pure spring water will have a low conductivity, while increasing amounts of minerals or impurities will cause higher conductivities.

5.2. Water Temperature

To minimise stress and injury in fish, avoid fishing in high water temperatures…

- 16°C to 18°C for salmonids.
- 22°C to 24°C for coarse fish especially when pike and perch are present.

As fish become dormant in colder water temperatures, fishing will not normally be as effective during the winter months.

5.3. Electric Field

When you are using the fishing system, an electric field will be generated around the anode and cathode, with the strength of the field diminishing as you get further away from the anode.

A voltage gradient is developed along the length of fish within the electric field, such that 'galvanotaxis' stimulates their nervous system and they are forced to swim towards anode (the source of the field).

At a point approaching the source of the field, the fish enters the hold-zone, where the field is then of sufficient strength to temporarily immobilise them and thus aid in their capture.

In most electric fishing situations it is desirable to create as large an effective capture field as possible. However in shallow and narrow streams there is no need to create a field that will attract fish from many metres away since any fish present will never be far from the operator, while in very turbid water there is equally no point in immobilising fish at a depth or distance from which they cannot be seen and retrieved.

The size and geometry of the anode is an important factor for field generation and fish health.

- Smaller rings (<250mm diameter) will produce more focused and intense fields using less power (and lower voltages), but the intensity of the field may be harmful to fish at closer ranges, and their use is not recommended under normal circumstances.

  If the physical nature of the stream necessitates the use of a very small anode (for instance fishing for Bullhead or young Salmonids, in shallow water conditions in a boulder-strewn stream) then the applied voltage must be reduced accordingly, perhaps to as low as 50 Volts
- Larger rings (>500mm diameter) will produce a more dispersed fields that require increased power (and higher voltages) to sustain them. In higher conductivity waters maximum usable anode size may be limited by the power available.

A 300mm anode ring is provided with the system as standard as this is considered a good balance between all the factors discussed above. Please contact E-Fish sales to discuss any other anode requirements.

In general, you should…

- **Never keep fish in the electric field for longer than necessary.**
- **Avoid getting too close to fish with an energised anode.**
- **Never touch a fish with an energised anode, as this may cause electrical burns to the fish.**

5.4. Voltage

The fishing voltage is the primary parameter that controls the size and strength of the electric field, and in order to attract and immobilise fish (without causing harm), it will need to be varied according to…

- Ambient water conductivity.
- The duty-cycle mode used. Either smooth Direct Current (DC, 100% duty-cycle) or pulsed Direct Current (PDC, less than 50% duty cycle).
- Size of effective capture electric-field required, and anode ring size used.

Low conductivity waters (less than 150 µS/cm) will generally require higher applied voltages for fish capture than higher conductivity waters (i.e. at least 300V). At medium and high conductivities, progressively lower voltages will be effective in fish capture because a lower voltage gradient is needed to elicit a response from fish at a given point in the electric field.

The overall aim during any electric fishing operation should be to maximise the effective field of fish capture whilst minimising the extent of the zone of very high voltage gradient around the anodes in which fish can be damaged. Where very sensitive or valuable species are present, operators should consider further reducing the risk of damage to fish by reducing applied voltage even if this means some compromise of fishing efficiency.

As a general approach, electric fishing under any field conditions should be started at the lower end of the range of voltages recommended for those conditions.

If you do not know the conductivity of the water, it is recommended to start at around 150V, assess the effect of fishing and keep making small adjustments until the best results are obtained.

Larger fish are generally susceptible to lower voltage gradients than smaller fish in any given situation.

The following are therefore recommended as a guide (duty-cycle mode is discussed in the following section)…

Conductivity	Voltage	Duty-Cycle Mode
Less than 150 µS/cm	select 300 to 400 Volts	DC only
150 to 500 µS/cm	select 200 to 300 Volts	Pulsed DC or DC
500 to 800 µS/cm	select 150 to 200 Volts	Pulsed DC only
800 to 1000 µS/cm	select 120 to 180 Volts	Pulsed DC only
Greater than 1000 µS/cm	select 100 to 150 Volts	Pulsed DC only

5.5. Duty-Cycle (Pulsed Versus Direct Current Operation)

The duty-cycle (ratio of on-to-off time) of the backpack output can be adjusted to vary the power output and achieve the best fishing results depending on the water conductivity, environmental conditions and type of fish being sampled.

- When the duty cycle is set to 100% the output is always on, and is referred to as Direct Current (or DC).
- When the duty cycle is than 100%, the output oscillates at the specified frequency, and referred to as Pulsed DC (PDC). Typically PDC is used with duty-cycles of 50% or less.

Use of DC for electric fishing potentially offers a number of advantages over other waveforms notably in respect of attraction properties and in terms of fish welfare, so DC should be used wherever and whenever it is practicable.

However, DC is a "power-hungry" waveform leading to reduced fishing time from a battery pack, but does prove particularly effective in low-conductivity waters where power demands are generally small. DC's effectiveness is also more prone to disruption by local variations in the conductivity of the riverbed, and it has limited ability to actually immobilise fish compared to PDC.

- **Attraction** of fish toward the anode can be achieved at voltage gradients of as little as 0.1 volts-per-centimetre (V/cm) when using DC.
  When using PDC (PDC – i.e. a duty cycle of 50% or less), gradients of 0.2 V/cm to 0.3 V/cm are needed.
- **Immobilisation** of fish using DC can be achieved at voltage gradients of 1.0 volt/cm whilst with PDC this can occur at gradients as low as 0.5 V/cm to 0.6 V/cm.

In low conductivity waters the voltage gradients needed to elicit attraction and immobilisation will be slightly higher than those given above, whereas in higher conductivity water these values will be slightly lower.

You should make every attempt to prevent the fish coming closer to the anode than the distance at which voltage gradient is sufficient for immobilisation and you should never touch a fish with an energised anode.

In summary…

	DC	Pulsed DC
Pro's	Better fish attraction and welfare properties compared to PDC operation. Effective in low conductivity water.	Better immobilisation properties than DC. Effective in higher conductivity water. Better power consumption (longer battery life) than DC.
Con's	A power-hungry waveform. Limited immobilisation properties	Limited attraction properties compared to DC.

	compared to PDC. Effectiveness is more prone to disruption by local variations in the conductivity of the riverbed.	Less prone to disruption by variations in riverbed conductivity.
Fish Attraction	Achieved at voltage gradients of as little as 0.1 V/cm	Gradients of 0.2 V/cm to 0.3 V/cm are needed.
Fish Immobilisation	Achieved at voltage gradients of 1.0 V/cm	Gradients as low as 0.5 V/cm to 0.6 V/cm are needed.

5.6. Frequency

With the Duty Cycle parameter set to 100%, the Frequency parameter has no effect. However, when using a Pulsed DC the choice of frequency will be influenced primarily by the species being sought, bearing in mind that under normal circumstances we wish to maximise the attractive properties of our electric field whilst reducing the immobilisation zone to a minimum.

Research has shown that whilst medium to high frequencies are more effective in capturing fish of some species groups, particularly salmonids, these are also more harmful.

- **Salmonids** – frequencies of 40Hz to 60Hz are as effective in attracting fish as the commonly used but potentially more damaging 100Hz. 40Hz will still immobilise salmonids but only within a much closer proximity to the anode.

  10Hz will attract salmonids but not immobilise.
- **Cyprinids** – optimum frequencies may vary but for roach 30Hz has been shown to give both good attraction and good immobilisation. Switching to 10Hz reduces the zone of immobilisation whilst increasing attraction properties.

  However, there may be difficulties in capturing cyprinids in some circumstances if they are only immobilised in a very small zone around the anode. An added benefit of use of 10Hz is that salmonids will be only slightly influenced by the electric field and unlikely to be immobilised at all.

  Therefore where adult salmonids are present and coarse fish surveys are being undertaken it is recommended that if pulsed DC is used, it may be worth considering fishing with low frequencies (10Hz to 30Hz).
- **Perch** – are more similar to salmonids in their response to electric fields and 100 Hz has the best attraction and immobilisation properties.

  However, as fish damage (to perch and other species) is more likely at this frequency, 30Hz to 40 Hz is recommended for percids though where good immobilisation is also required then 10Hz is better
- **Pike** – little research or reference is available in scientific literature, but fishing at 30Hz to 50Hz has proved effective.
- **Eels** – most frequencies investigated were effective in both attracting and immobilising eels, so bearing in mind the potentially more harmful effects of higher frequencies on some other species, frequencies of 10Hz to 40Hz should be employed as standard.

6. UNDERTAKING ELECTRO-FISHING

The following section discusses the some 'best-practice' working procedures you should follow to connect, configure and use your electro-fishing system.

6.1. Selecting A Site

When selecting a site suitable for backpack electro-fishing, you should consider the following…

- Water should be no deeper than 0.8m (hip depth), and this should taking into account any soft sediment that the operator may sink into.
- For effective fishing with a single anode backpack, the watercourse should be around 10 metres maximum width.
- The flow of water should not present a safety hazard or be capable of causing an operator to loose their footing.
- In emergency, does the site have good reception for a mobile phone call, and is access easy and clearly signposted for emergency vehicles or rescue personnel.
- Is there public or animal access to the site – if so, you should display suitable warning signs (stating "Danger: Electric Fishing In Progress"), or erect barriers to restrict access to the area you are working in.

Do not attempt to use your backpack fishing system from a boat or in water deeper than 0.8 metres.

6.2. Selecting Equipment

You should select the equipment required according to the nature of the site and the conditions at the time of operations.

When choosing any equipment or items of clothing you should ensure that any part of it that can come in contact with water it is made from a non-conducting material, especially handles, toggles and zips.
Wooden handles, some ropes or other wicking materials may be classed as conductive if they become waterlogged. This could present an electric shock hazard to the user or surrounding personnel.

6.2.1. Clothing

In general…

- Clothing worn for electro-fishing activities should be chosen to suit the environmental and geographical conditions of the fishing site.
- Clothing items should not be too long, such that they trail in the water as this could interfere with the generation of the electric field and present a current path and electrical hazard.
- Clothing should not have any buckles, buttons or other features that could snag on cables or other equipment in use.
- Unprotected metallic zips that could present a current path if they enter the water during fishing operations.

For Chest Waders and Dry-Suits…

- Check waders and dry suits must be made from a non-conductive material.
- Do not wade in water deeper than hip height, as the backpack is not designed for use in such situations.

Boots…

- Operators and support personnel should always wear rubber boots in good condition.
- Any studs on footwear (to prevent slipping) must not penetrate the sole of the boot, and negate its insulating properties.

6.2.2. Safety Equipment & First Aid

- Life jackets are recommended for any situation where you may be working in water that is greater than knee depth, or there is a risk of immersion and drowning.
- A whistle should be carried (with agreed and understood signals) where members of the operating team are working sufficiently far apart to impede verbal communication in an emergency.
- A standard first aid kit should always be carried as part of the equipment used.

6.2.3. Other Equipment

For fishing and survey work you will probably also need…

- Additional nets.
- Fish containers and Buckets.
- Rucksack or other carrying bag.
- Measurement boards.
- Stop nets
- Water conductivity meter (for assessing initial operating settings).

6.3. Selecting A Team

For safety, when electro-fishing, a team should normally contain three members: an operator, and two assistants who will catch and remove fish from the water in the proximity of the anode, and perform any adjustments to the backpack controls.

Selection and training of team members is critical to ensure electro-fishing activities are performed in a safe manor. Please refer to the safety considerations discussed in the "Personnel" section on page 9 when choosing team members.

At least two of the team member should be experienced users of the system.

If you plan to use two member teams, you should ensure team members have fully understood the risk associated with the activity and watercourse, are both experienced and suitable emergency procedures and communication methods are established.

Electro-fishing work should never be undertaken by any single person! Should accident or injury occur, there should always someone else present to isolate equipment, perform first aid, and summon medical assistance if required.

6.4. Setting Up The Fishing System

6.4.1. Charging the Battery Pack

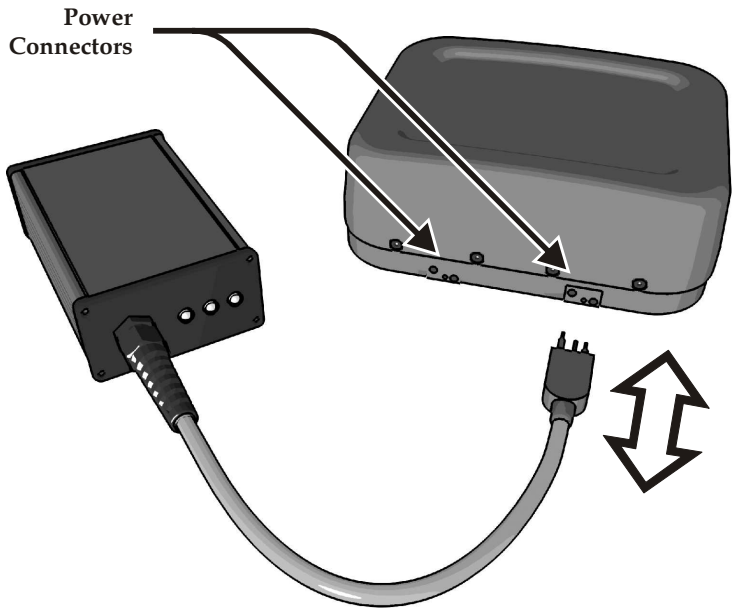
For information about battery packs, weights, duration, recycling and reconditioning, please refer to "Battery Pack Features" on page 18.

Before using your system for the first time, please ensure that all battery packs are fully charged. To maximise battery life, you should also store battery packs in a fully charged condition, and if battery packs are in storage you should top up their charge every 6 months.

To charge the battery…

5. With the charger unplugged from the mains, connect the charger to one of the two power connectors on the battery pack. To deliver large amounts of power, the battery packs contain two power sockets that are internally connected to an internal fuse.

   You may connect the charger unit to either of these connectors, but should never connect more than one charger at a time.
   Do not attempt to charge more than one battery at a time by daisy-chaining connections.



6. Plug the charger into the mains supply, and turn on the power switch (located at one end of the housing).

   During charging, the battery pack may emit small amounts of hydrogen gas. You should always charge battery packs in a well ventilated area, to ensure that there is no build up of gas in the atmosphere.

7. The charger uses a 3-stage process, with coloured status light showing the mode…
   - Red (Constant Current Mode) - For discharged batteries this state will be active for most of the charging cycle.
   - Yellow (Constant Voltage Mode) – As the battery nears full charge this stage will be used to finish the charge cycle, and takes approximately 1 hour.
   - Green (Standby Mode) – Once charging is complete, the charger enters standby mode where it will keep the battery topped up as needed. The battery can be left on charge

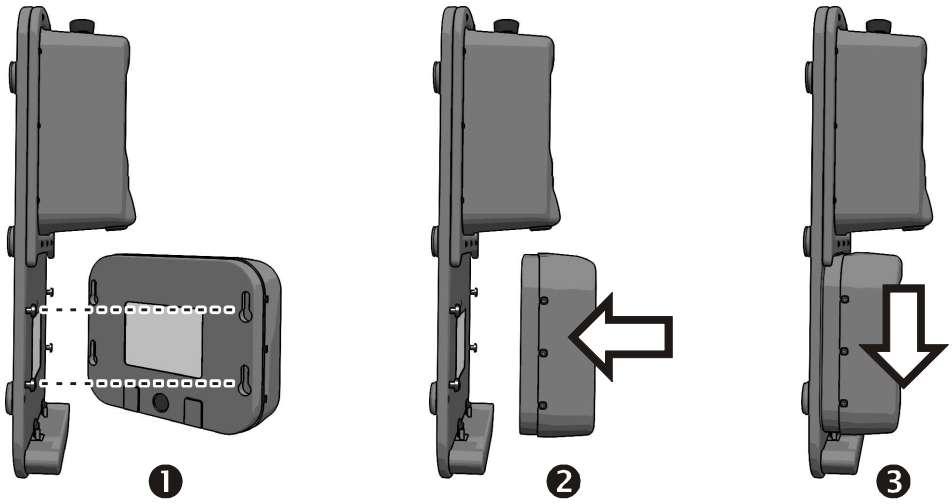
for long periods of time in this state.

8. Once charging is complete and the Green light is illuminated, power down the charger before disconnecting from the battery pack.

6.4.2. Fitting The Battery Pack

The quick change battery modules allow the backpack power source to be easily and simply replaced while in the field, without the need to open housings and incur lengthy downtime.

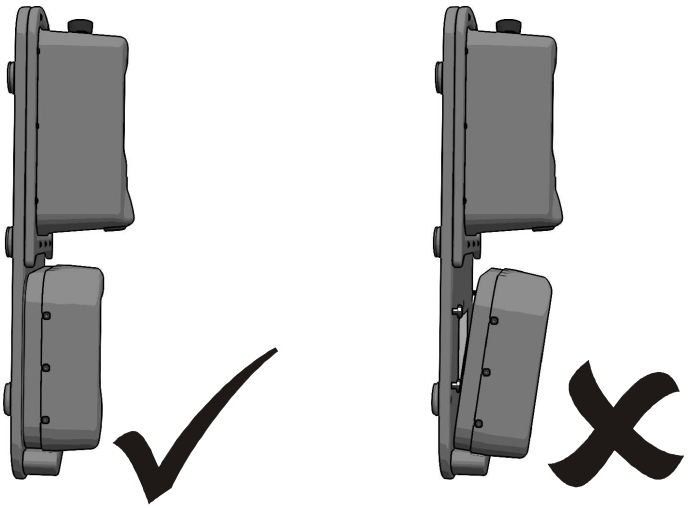
To fit the battery pack…



1. Align the four large holes on the base of the battery pack with the four corresponding locating pegs on the backpack base plate.
2. Lower the battery pack down over the locating pegs, so the battery pack sits flat on the base plate.
3. Slide the battery pack downwards towards the bottom of the battery pack. The power connector pins should align with the socket holes on the battery pack.

   Do not force the battery into place – check the pins are correctly aligned, and use a little silicone grease on the rubber parts of the connectors to reduce friction.
4. Check the battery pack is secure and will not fall off when the backpack is moved. A correctly fitted battery pack should look like the left figure above.

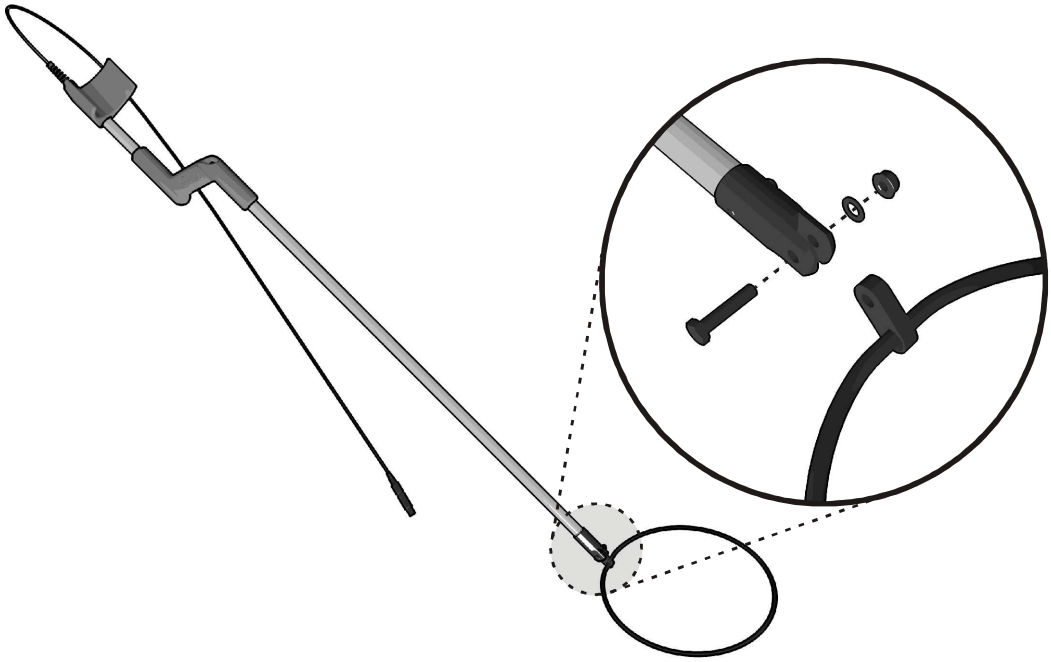
Do not force the battery pack directly onto the power connectors, and check the locating lugs have engaged to hold the battery in place. Failure to do this may cause damage the backpack or the battery module.



6.4.3. Fitting The Anode Ring

Normally, you will only need to change the anode ring when using your system for the first time, or a different anode shape is required due to fishing conditions and the desired strength or geometry of the electric-field produced.

The angle of the anode ring relative to the pole may be adjusted to obtain the most comfortable position for the operator.



To fit the anode ring, use two 13mm spanners (or suitable equivalent) to tighten the bolt, washer and nut as shown in the figure above.

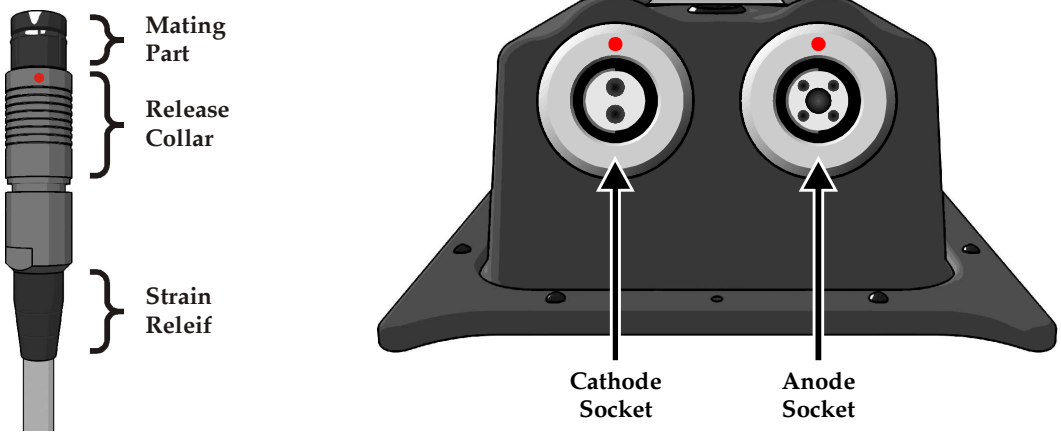
For safety, never attempt to adjust or change the anode ring with the anode connected to the backpack.

6.4.4. Connecting The Anode & Cathode

For safety, it is good practice to power down the backpack before connecting either the anode pole or cathode wire.

To connect the anode or cathode…

1. Check that both the socket receptacles and plugs are clear of mud or other detritus that may affect a good electrical connection.
2. Hold the plug by the "release collar", align the red dot on the plug with the corresponding dot on the socket, and firmly insert the mating part into the relevant socket until you hear an audible click.



(sockets not drawn to scale)

Please note that once the connectors are mated (plug into socket) they are waterproof. However, when disconnected, care should be taken to avoid getting water, dirt or other material on the electrical connections.

To disconnect either the anode or cathode…

3. Hold the plug firmly by the release collar.
4. Pull the collar and plug straight backwards away from the socket.

If used correctly, the plug should release from the socket without excessive force. Never attempt to unplug either the anode or cathode by pulling the cables directly, as this will cause damage.

6.5. Pre-Fishing Checks

Once you have connected the battery, anode and cathode, and configured the backpack settings using the procedures described previously, you are almost ready to start electro-fishing. However, before commencing re-familiarise yourself with the hazards identified in the "Safety Considerations" section on page 8, and also observe the following points…

6.5.1. Personnel Checks

- Suitable protective clothing is being worn by all personnel in proximity of the fishing system.
- Brief all personnel on the hazards of electro-fishing, and on the necessary safety and emergency procedures.
- Do not energise the Anode (press the trigger) until all team members have acknowledged that they are ready for operation, and the electrode is fully submerged in water.

6.5.2. Site Checks

- Suitable warning signs and barriers are in place to prevent danger to spectators or wildlife.
- Stop nets and other equipment is in place.
- Submerged or bank-side hazards in the water-course have been identified.

6.5.3. Equipment Checks

- Ensure all battery packs are fully charged before use in the field.
- The anode ring and cathode wire are clean and free from weed or other marine vegetation.
- The anode and cathode connectors are fully engaged.
- The battery pack is correctly fitted and will not come loose during fishing activity.
- Check housings, cables and connectors are free from detritus and damage. Do not use equipment if it appears to be damaged or defective in any way.
- Check the tilt sensors are working correctly by tilting the backpack away from the vertical position while powered up – a sensor warning should be displayed when the tilt threshold is reached (even when fishing is not in progress).
- The immersion sensor is clean and free from any mud or detritus that may cause it not to function correctly. Momentarily submerge it in water to test its operation on the display.
- Ensure the equipment is securely worn by the operator, and harnesses and buckles are correctly fastened.
- Ensure there is clear and unobstructed access to the Stop button on the backpack.

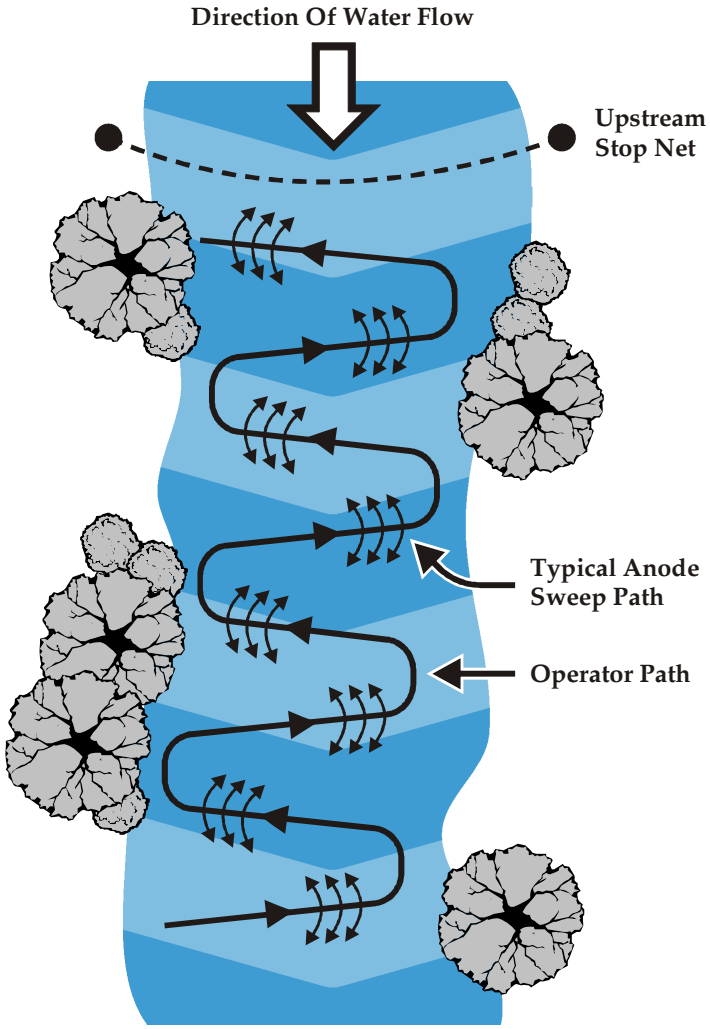
6.5.4. Fishing Setup

- Water conductivity and temperature have been measured.
- Setup the fishing machine as described in the section "Using The Backpack" (page 35), using the best practice guidelines on selecting settings from the section "Fishing Theory & Settings" (page 20).

6.6. Electro-Fishing Technique

The diagram below shows the typical procedure used for surveying a section of river when working upstream (although this is not always necessary, and downstream fishing has been shown to also be effective).

- The operator should walk in a zig-zag pattern across the water-course sweeping the anode in front of them across their path. Optionally the operator may choose to also use a catch net to capture and transfer to the fish holding bucket.
- A team member should accompany the operator with a catch net and fish holding bucket.
- Where possible, you should fish in a discontinuous manner, briefly switching off the anode at intervals (whilst keeping it in the water) such that fish are not driven ahead of the fishing team.
- For survey work, it may be desirable to erect an upstream stop net to further fish entering the survey zone.



Please note that the E-Fish backpack is only suitable for wading fishing operations and should not be used from a boat or in combination with other electro-fishing systems.

In addition to the general points discussed in the "Safety Considerations" section (page 8)…

- Do not allow unprotected parts of the body to come into contact with the water.
- Only the backpack and anode operator should remove debris from the electrodes (anode ring and cathode tail), when they are sure the system is de-energised (and the Stop button is locked in).
- Stop fishing if people or animals come within 5 metres of the electrodes
- Do not allow the anode ring to leave the water.
- Do not leave any live equipment unattended.
- Do not simultaneously use more than one set of electro-fishing equipment.
- Never restrict access to the Stop button on the backpack.

6.7. Fish Welfare

When handling fish, the following rules should be observed…

- Avoid fishing in high water temperatures (16°C to 18°C for salmonids, 22°C to 24°C for coarse fish especially when pike and perch are present)
- Use separate bins for large and small fish and for eel.
- Provide aeration (oxygen diffuser plus compressed air is best) in both catch bins and fish storage bins – this is essential in warmer weather and when large numbers of fish are expected.
- Keep-cages and keep-nets are a good alternative to fish storage bins but ensure there is adequate depth of clean, gently-flowing, well-aerated water. If these conditions are not available at the survey site then storage bins are preferable.
- Carry a range of sizes and types of measuring boards to reflect the sizes and species of fish encountered.

Bad handling of fish which are already under some stress as a result of capture can exacerbate problems and cause injury.

6.8. Storage & Transit

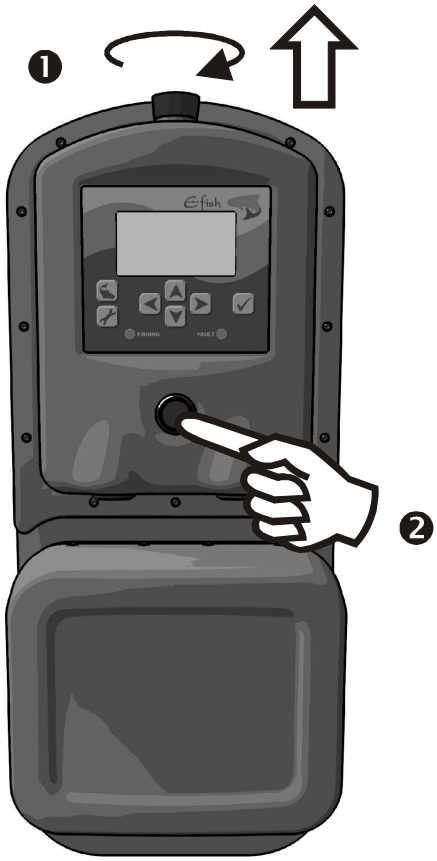
After you have used your electro-fishing system, please follow the procedures and points discussed in the "Care Of Your Fishing System" section on page 52.

Always store and transport your backpack in the padded and rugged transit case supplied with your fishing system. This will avoid damage occurring to the housing, display and operational controls, as well as reducing the chance of detritus entering the connectors.

7. USING THE BACKPACK

7.1. Powering Up (& Resetting) The Backpack

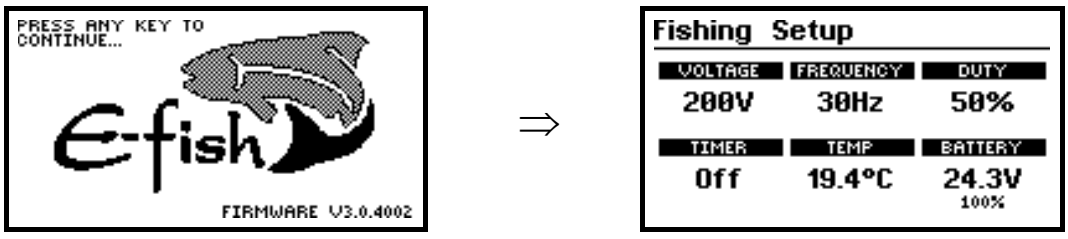
Once you have successfully connected a charged battery to the backpack using the previously described procedures, you are ready to power up the system.



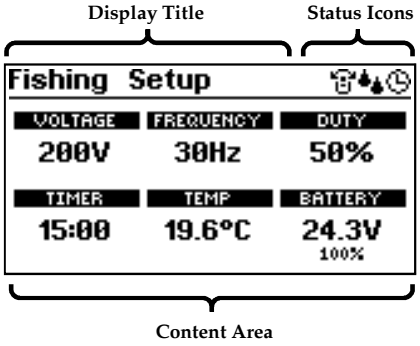
As mentioned in previous sections, there are circumstances where a sensor or fault may cause the system to shut down and display an error message. In such situations, this procedure is also used to reset the system and resume fishing (with any previous fishing settings being retained).

To power up or reset the backpack…

5. If the Stop button has been pressed (the yellow band is covered by the red cap), twist the red cap clockwise until the latch releases and the red cap springs upwards.
6. Press the green "Reset" button on the centre of the housing. If the system powers up correctly, the button will be illuminated green.
7. The "Welcome" screen will be displayed. Press any key on the keypad to continue to the "Fishing Setup" display.



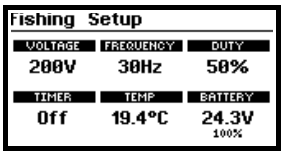
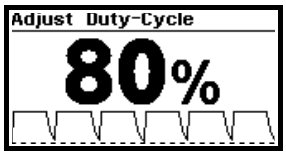
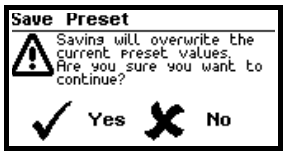
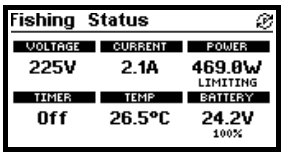
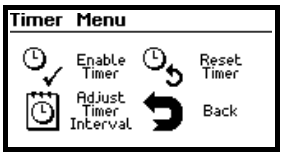
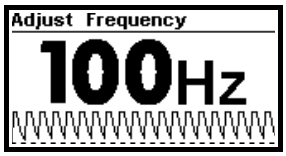
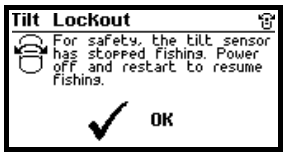
7.2. The User Interface



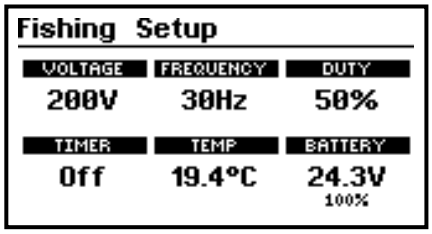
The keypad and graphical display allow to the operator to quickly and easily adjust the fishing settings, monitor the fishing status, and respond to any warning or error messages. For simplicity, the display area is divided into three sections…

- **Display Title** – This shows the function of the current screen (i.e. menus, parameters, information message etc.)
- **Status Icons** – This area displays any information, warning or alarm icons indicating the current state of the backpack.
- **Content Area** – This area of the screen changes depending on the current state the user interface is in. It may contain menu items allowing different functions to be selected, or provide status information. The operator can interact with this part of the display using the keypad buttons.

The following summarised the four main types of display and the keypad actions available…

	Setup & Status Information	**Menus**	**Parameter Editors**	**Messages & Questions**
eg…				
				
	Shows the "Fishing" menu.	Returns to the "Fishing Setup" display	Aborts editing, and returns to the "Fishing Setup" display.	Aborts the message, and returns to the "Fishing Setup" display.
	Shows the "System" menu.			
   	Moves the cursor around the display to highlight an item (not all items can be selected – i.e. Temp and Battery)	Moves the cursor (flashing square) around the menu items, and scrolls up and down the menu if more items are available than can be shown.	Scrolls the value of the parameter (or selected digit) up or down.	Selects the required operator response with a flashing cursor.
			Select the digit to adjust (with a flashing cursor), or the whole value (no cursor).	
	Perform the selected items function.	Perform the selected items function.	Confirm the edited parameter value.	Confirm the selected response.

7.3. Fishing Setup Display



When idle, the "Fishing Setup" display is shown, and this is split into six tiles…

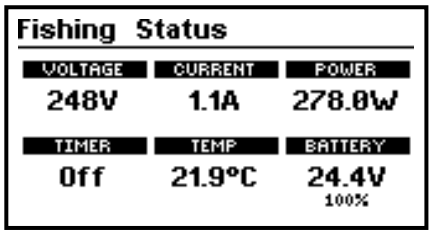
- **Voltage, Frequency & Duty** – Shows the output voltage, frequency and duty-cycle settings that will be used when you next start electro-fishing.
- **Timer** – Shows if the fishing timer is enabled, how much time is remaining on it, or how much time is remaining until the current fishing period expires.
- **Temp** – Shows the temperature inside the backpack electronics housing, and any "warm" or "overheat" warnings.
- **Battery** – Shows the current battery voltage, and the approximate percentage of capacity remaining or any "low" or "flat" warnings.

Press the "Fishing" button to display to the "Fishing Menu", where the electro-fishing output parameters can be adjusted.

Press the "System" button to display the "System Menu" where features like the fishing timer can be enabled and configured, or presets stored and retrieved.

Use the cursor keys and "Select" to highlight and jump directly to the parameter editors for "Voltage", "Frequency", "Duty-Cycle" and "Fishing Timer".

7.4. Fishing Status Display



When the anode trigger is pressed, the "Fishing Status" display is shown. Like the "Setup" display, this is split into six tiles…

- **Voltage** – Shows the actual voltage being delivered into the water via the anode ring. The conductivity of the water will affect the load on the backpacks power supply, and heavier loads may pull the voltage down from the set value.
- **Current** – Shows the current (in Amps) being delivered into the water. Higher conductivity waters will allow larger currents to flow.
- **Power** – Shows the power (in Watts) being delivered. Power is calculated by multiplying voltage and current together, and the backpack is capable of supplying up to 500W. Larger power consumptions (in higher conductivity waters) will discharge the batteries quicker and lead to reduced fishing durations.
- **Timer** – Shows if the fishing timer is enabled, how much time is remaining on it, or how much time is remaining until the current fishing period expires.
- **Temp** – Shows the temperature inside the backpack electronics housing, and any "warm" or "overheat" warnings. Larger power consumptions will cause the internal temperature to increase quicker than lower power consumptions.
- **Battery** – Shows the current battery voltage, and the approximate percentage of capacity remaining or any "low" or "flat" warnings.

7.5. Status Icons

Status icons are shown in a row at the top right of the display, and give a quick overview of the current status of the backpack to the operator, including any warnings or alarms.

During normal operation, the following icons may be displayed…

 • **Active-Power-Control Enabled**	Displayed when APC has been activated by the user and the power supply is trying to deliver the maximum power (not current) into the water.
 • **Battery Flat**	Displayed when the battery has been discharged to a point where it doesn't have enough energy to continue fishing
 • **Battery Low**	Displayed when the battery has only 20% of its capacity remaining before fishing cannot continue.
 • **Fishing Timer Enabled**	Displayed when the fishing timer has been enabled. When enabled, the counter will be decreased when the fishing trigger is pressed, until it reached zero when fishing will be disabled until it is reset.
 • **Fishing Timer Expired**	Displayed when the fishing timer has been in used, and its set period has expired after a period of fishing. Reset or disable the timer to resume fishing.
 • **Internal Communications Error**	Displayed if the internal power control module is failing to communicate with the user display module. . This icon may be shown briefly during power up, but if this icon persists, please contact E-Fish Technical Support.
 • **Internal Configuration Error**	Displayed if the power control module hasn't been configured. This icon may be shown briefly during power up, but if this icon persists, please contact E-Fish Technical Support.
 • **Presets Locked**	Displayed when the preset-memory settings have been locked, and their contents cannot be changed by the user.
 • **Temperature Alarm**	Displayed when the internal circuitry of the backpack has got to hot (over 60°C), and fishing has been shut down. This icon will continue to be displayed until the internals of the backpack has been allowed to cool to below 50°C.
 • **Tilt Sensor Alarm**	Displayed when the backpack orientation has been tilted outside its allowable operating limits when fishing. Return the backpack to the upright position to clear the alarm. If the backpack has been tilted for more than 5 seconds, the alarm will lockout operation, and the backpack will need to be powered down to clear the alarm.
 • **Water Sensor Alarm**	Displayed when the water sensor has become submerged. If the sensor was submerged for more than 5 seconds, the alarm will lockout operation, and the backpack will need to be powered down to clear the alarm.

Additionally, the following icons may be observed during self-testing or servicing procedures…

	• **Speaker Muted**	Displayed if the audio speaker has been disabled.
	• **Engineering/Service Mode**	Displayed when the backpack is put into a special 'engineering mode' used during servicing.
	• **Temperature Sensor Disabled**	Displayed when the temperature sensor and lockout has been disabled. This icon should not be shown during normal fishing operation.
	• **Tilt Sensor Disabled**	Displayed when the tilt sensor and lockout has been disabled. This icon should not be shown during normal fishing operation.
	• **Water Sensor Disabled**	Displayed when the water sensor and lockout has been disabled. This icon should not be shown during normal fishing operation.

7.6. System Menu

Pressing the "System" button from the "Fishing Setup" screen will display the system menu. From this menu, the operator can change the fishing parameters, configure the fishing timer and save or load preset settings.

When the menu is displayed, use the cursor keys to highlight the required menu item, and press "Select" to confirm. The scroll-bar to the right of the display indicates that there are more menu items available than can be shown on the screen, and the position of the currently visible part of the menu relative to these.

The menu contains the following items…

- **Fishing Menu** – displays a sub-menu containing functions that allow the operator to configure the fishing output.

- **Timer Menu** – displays a sub-menu containing functions relating to the fishing timer, that allows the operator to control the length of permitted fishing when undertaking survey work.

- **Load Preset** – displays a sub-menu allowing the operator to recall the current fishing settings (voltage, frequency, duty-cycle and power limit) from one of the ten preset-memory locations.

- **Save Preset** – displays a sub-menu allowing the operator to save the current fishing settings (voltage, frequency, duty-cycle and power limit) into one of the ten preset-memory locations.

- **Tools Menu** – displays a sub-menu containing diagnostic and servicing functions.

- **About** – displays an screen containing information about the backpack and contact details for E-Fish (UK) Ltd.

- **Back** – returns to the previous display.

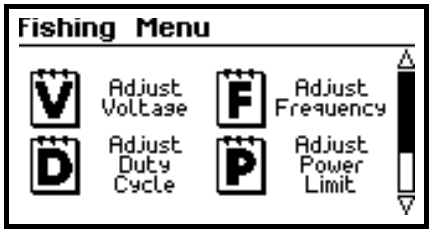
7.7. Configuring The Fishing Settings

The fishing settings control how the electric field is generated through the water between the anode ring and cathode.

For optimal performance, and to avoid harming fish, you should choose the fishing settings based on the recommendations discussed in the manual section "Fishing Equipment & Working Practices".

For safety, it is good practice to configure the fishing settings before connecting the anode and cathode, however this is not mandatory.

7.7.1. Fishing Menu



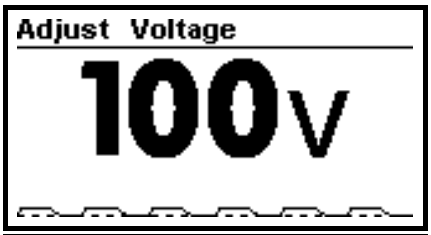
Press the "Fishing" button to display to the "Fishing Menu", or choose "Fishing Menu" from the "System Menu".

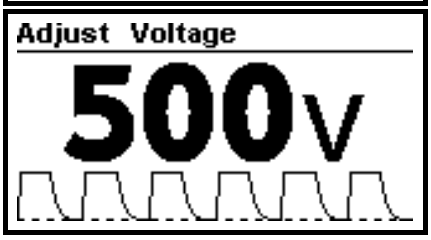
The menu contains the following items…

- **Adjust Voltage** – displays an editor allowing the operator to change the output voltage from the backpack between 50 and 500 Volts.
- **Adjust Frequency** – displays an editor allowing the operator to change the output frequency from the backpack between 10 and 100 Hertz (cycles per second).
- **Adjust Duty Cycle** – displays an editor allowing the operator to change the output duty-cycle from the backpack between 10% and 100%.
- **Adjust Power Limit** – displays an editor allowing the operator to change the maximum amount of energy the backpack is allowed to put into the water, between 50 and 500 Watts. Normally this would be set to maximum.
- **Enable/Disable APC** – toggles weather 'active power control' is enabled of disabled. For further details on APC, please refer to the section below…
- **Back** – returns to the previous display.

7.7.2. Adjusting The Voltage

The Voltage parameter controls the peak strength of the electric field. Measured in Volts (V), it may be adjusted between 50V and 500V.





The Voltage is shown as the large number in the centre of the display, and an output preview at the bottom of the display shows the effect the changes will have on the fishing output.

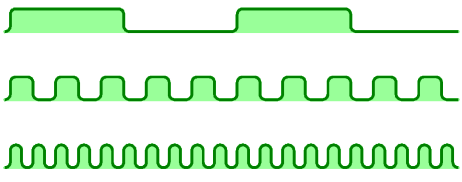
Use the Up and Down cursor keys to cycle through the voltage range.

Alternately, use the Left and Right cursor keys to select an individual digit to adjust, then use the Up and Down keys to cycle through value form 0 to 9.

When the adjustments are complete, press the "Select" key to confirm your choice.

7.7.3. Adjusting The Frequency

The Frequency parameter controls the speed at which the electric field is pulsed. Measured in Hertz (Hz), it specifies the number of times per second that the field is switched on and off, and may be adjusted from 10Hz (slowest) to 100Hz (fastest)…

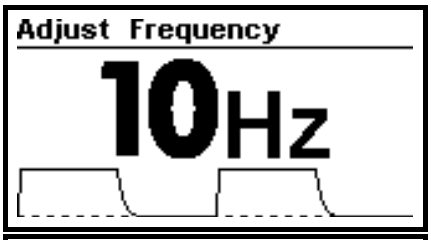


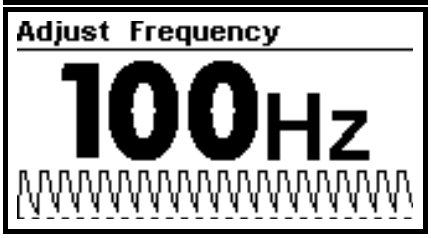
10Hz Signal

50Hz Signal
5 times faster than 10Hz

100Hz Signal
10 times faster than 10Hz

The Frequency is shown as the large number in the centre of the display, and an output preview at the bottom of the display shows the effect the changes will have on the fishing output.





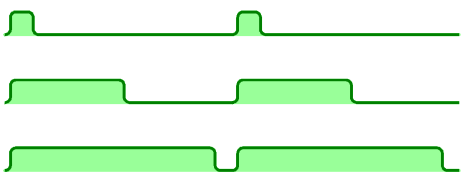
Use the Up and Down cursor keys to cycle through the Frequency range.

Alternately, use the Left and Right cursor keys to select an individual digit to adjust, then use the Up and Down keys to cycle through value form 0 to 9.

When the adjustments are complete, press the "Select" key to confirm your choice.

7.7.4. Adjusting The Duty Cycle

The Duty-Cycle parameter controls how long the output is turned on for in each output cycle, at the specified frequency. Measured as a percentage (%), it is the ratio of on-time to off-time, with 0% being no energy and 100% being a direct-current (DC)…

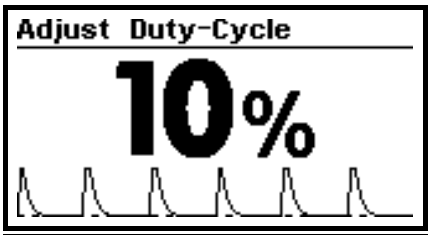


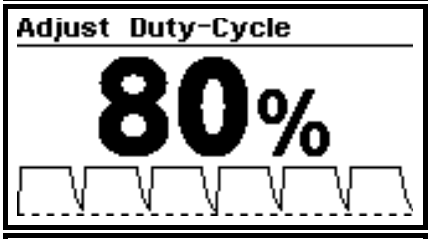
10% Duty Cycle

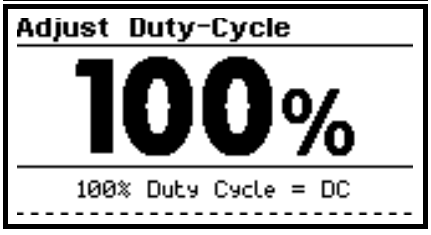
50% Duty Cycle

90% Duty Cycle

The Duty-Cycle is shown as the large number in the centre of the display, and an output preview at the bottom of the display shows the effect the changes will have on the fishing output.







Use the Up and Down cursor keys to cycle through the Frequency range.

Alternately, use the Left and Right cursor keys to select an individual digit to adjust, then use the Up and Down keys to cycle through value form 0 to 9.

When the adjustments are complete, press the "Select" key to confirm your choice.

7.7.5. Adjusting The Power Limit

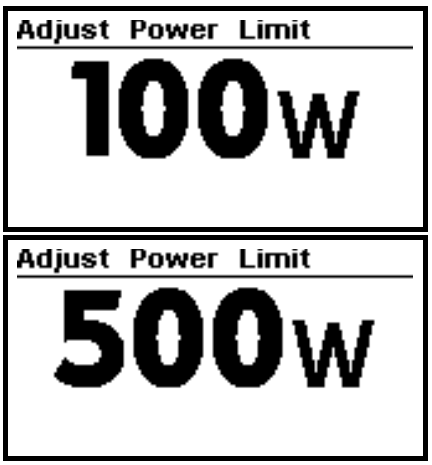
Under certain circumstances (such as operating in high-conductivity water, or in air temperatures where the backpack is shutting down to prevent overheating), you may want to limit the maximum amount of power can be supplied by the backpack, and hence the strength of the electric field that is generated through the water between the anode ring and cathode.

Measured in Watts (W), power is calculated by "*Power [Watts] = Voltage [Volts] × Current [Amps]*", and when the limit is reached, the voltage is automatically reduced.
The Power-Limit specifies the maximum amount of power that can be supplied, as the actual power required is governed by the applied voltage and the conductivity of the water being fished. It may be limited within the range of 50W to 500W.

Use the Up and Down cursor keys to cycle through the Power range.

Alternately, use the Left and Right cursor keys to select an individual digit to adjust, then use the Up and Down keys to cycle through value form 0 to 9.

When the adjustments are complete, press the "Select" key to confirm your choice.

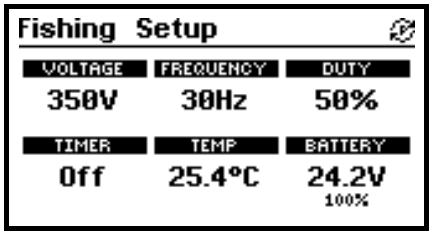


7.7.6. Active Power Control (Current Limiting versus Power Limiting)

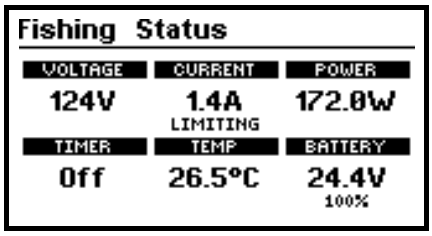
Active Power Control (APC) is a feature, that when enabled, allows the backpack to continuously adjust its output voltage to ensure that the largest amount of energy is always being put into the water, up to the settings specified by the operator.

Without APC, when the conductivity of the water increases to a point that the internal power supply in the backpack reaches its "Current Limit" for the specified operating voltage and power-limit, the output voltage reduces and the power supply is said to be in "Constant Current Mode". This reduction of voltage is necessary to deliver the current setting derived from the power-limit, but reducing the voltage also reduces the output power delivered. APC monitors the resistance of the water and selects the best voltage and current settings (always lower than the operator specified value) to best achieve the target power limit. When this occurs, the power supply is said to be in "Constant Power Mode" – the word "LIMITING" is displayed below the Power reading on the "Fishing Status" screen.

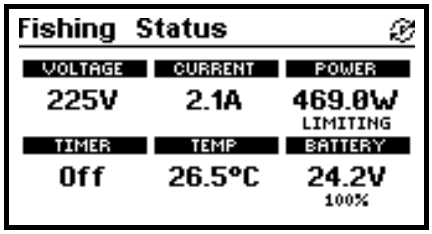
The screen-shots below show an example of APC operating…



The "setup" screen shows a 300V output is required before fishing starts. The Power Limit has been set to 500W for this example.



APC is disabled (no status icon visible), fishing is in progress and the output is current limiting to 1.4A (indicated by the word "LIMITING" below the current reading). The voltage has collapsed to 124V and consequently the output power is 172W.



APC is enabled with the same settings as above. To prevent current limiting, the backpack has measured the waters resistance and determined that an output of 225V at 2.1A is optimal to deliver as close to the target 500W as possible without causing current limiting.
Note the icon in the top right of the display indicating APC is active.

7.8. Saving & Loading Fishing Presets

For convenience when repeatedly visiting the same fishing sites, you may want to store or recall the fishing settings (discussed in the previous section) to or from one of the 8 preset memories.

7.8.1. Save Settings To A Preset

If preset memories have been locked (see below), this procedure is not available. The 'padlock' (🔒) status icon will be shown at the top of the display.

8. First setup the current fishing settings as required (voltage, duty cycle, frequency and power limit.)
9. Show the "System Menu", then select the "Save" function, with the icon that resembles a floppy-disk.
10. Choose the preset memory to save to the settings to, from 1 to 10.
11. Press the "Enter/Select" button to confirm the selection.
12. If the preset memory you selected already contains values, you will be asked if you want to overwrite these. Use the cursor keys and "Select" to make your response.
13. Your settings will now have been stored into your selected preset.

7.8.2. Load Settings From A Preset

14. Show the "System Menu", then select the "Load" function, with the icon that resembles a folder.

15. Choose the preset memory to load to the settings from.

16. Press the "Enter/Select" button to confirm the selection.

17. The fishing settings will now have been recalled and are displayed on the "Fishing Setup" screen. When you next press the anode trigger button, these settings will be used.

7.9. Locking & Unlocking Presets

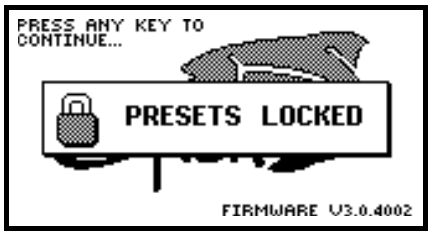
If your fishing backpack is used by more than one person, or you wish to document the fishing presets for your own procedures and reference, you may wish to prevent the settings from being accidentally changed.

To lock (or unlock) the settings and presets…

18. If locking, first ensure all the presets and system settings are configured and stored correctly.

19. Once the settings are applied, power down the backpack by pressing the red "Stop" button.

20. Power up the backpack and at the welcome screen press and hold both the "Left" and "Right" arrow buttons together. This will toggle lock status of the presets, and a message displayed to confirm this.



21. Press any key to continue to the "Fishing Setup" screen
22. If the presets are locked, a small padlock icon (🔒) will be displayed in the status area and the "Save" option (💾) is removed from the "System Menu".

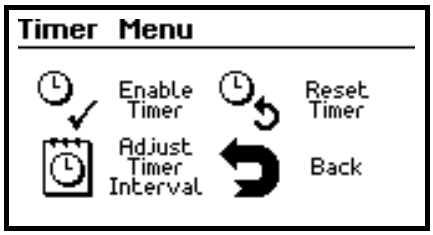
Once the settings are locked, you will not be able to save or overwrite memory presets, but you still can recall a preset and adjust the current fishing settings.

7.10. The Fishing Timer Function

This fishing timer allows you to define and limit fishing activity to a given time period, and can be useful when undertaking survey work.

When enabled, the timer counts-down towards zero while the fishing trigger on the anode is pressed, and will stop (but not reset) when the trigger is released.

7.10.1. Timer Menu



Pressing the "System" button to show the System Menu, then select the "Timer Menu" icon and press "Select" to display the "Timer Menu".

The timer menu contains the following items…

- **Enable/Disable Timer** – this function toggles the enabled state of the timer. A small icon (⏲) will be shown in the status area of the display to indicate the timer function is enabled.
- **Reset Timer** – When the operator has completed a period of timed fishing, the backpack will lockout further fishing until the timer is reset using this menu option.
- **Adjust Timer Interval** – Display an editor that allows the timer value to be adjusted.
- **Back** – returns to the previous display.

7.10.2. Adjusting The Fishing Timer

The interval that the fishing timer runs over can be adjusted using this menu option, from 1 second up to 1 hour.

Use the Up and Down cursor keys to cycle through the voltage range.

Alternately, use the Left and Right cursor keys to select an individual digit to adjust, then use the Up and Down keys to cycle through value form 0 to 9.

When the adjustments are complete, press the "Select" key to confirm your choice.

7.11. Performing A Self Test

At regular intervals of use, or if you are experiencing any technical difficulties, you may want to instruct the backpack to perform a self-test. During this procedure, the backpack will use an internal load resistance to simulate fishing conditions, and perform several voltage tests.

At no stage during the self test should fishing voltages be applied to the anode. However, as a safety precaution, it is advised to always disconnect the anode and cathode before performing a self-test.

To perform a self-test…

23. Show the "System Menu" then select the "Tools Menu".

24. Select the "Self-Test" menu item.

25. Press the "Enter/Select" button to perform the self-test and follow the on-screen instructions. This will take about 5 minutes to complete.
26. When the test is complete, "Pass" or "Fail" will be displayed on the screen along with any additional error or status information.

7.12. Resetting To Factory Defaults

On occasion, or if you are experiencing technical difficulties, you may want to reset the entire backpack back to its factory default settings. To perform the reset…

27. Show the "System Menu" then select the "Tools Menu".

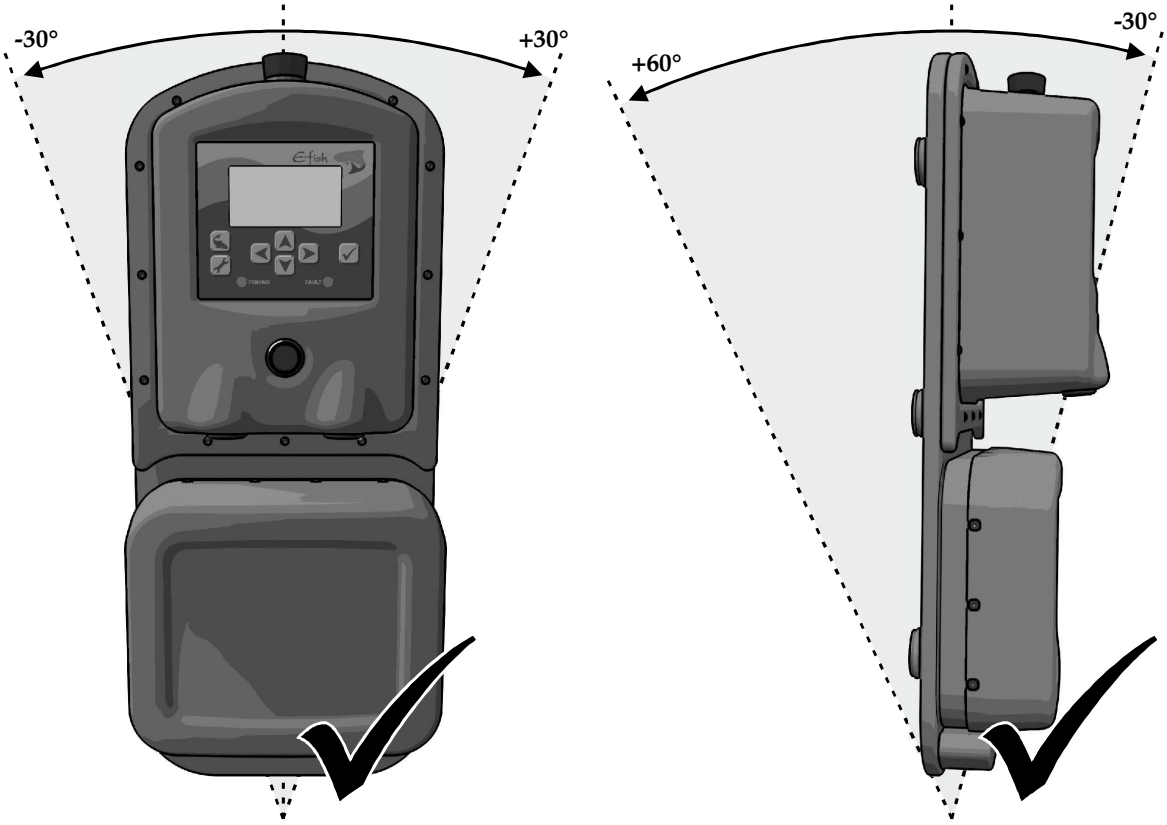
28. Select the "Reset To Defaults" menu option.
29. Follow the on screen instructions; you will be prompted asking if you want to continue.
30. When the "Fishing Setup" screen is displayed, and the default settings should have been applied. This will include…
    - Resetting the current fishing settings to their default values.
    - Clearing down the fishing preset memories
    - Clearing the memory lock if it was activated.
    - Resetting any fishing timer settings.

7.13. Sensors, Alarms & Timeouts

7.13.1. Tilt Sensor

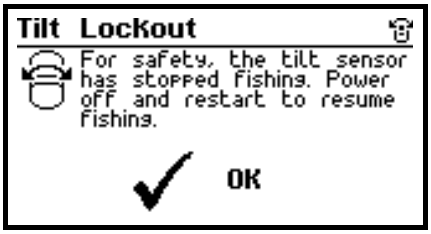
The fishing backpack is fitted with a smart tilt sensor system that can determine the angle the backpack is inclined at.

The backpack will only allow fishing to start when the backpack is oriented vertically in both axis, and should the backpack be tilted beyond its safety limits (see below), fishing will be immediately shut-down.



However, should the user duck forward under an obstacle (such as a branch), fishing will be disabled while the backpack is outside its safety limits plus a further one second after you return to a correct orientation.

If the backpack remains outside its safety limits for a continuous five seconds, then fishing will be permanently disabled, and an error message displayed, along with the 'tilt' status icon ( ).



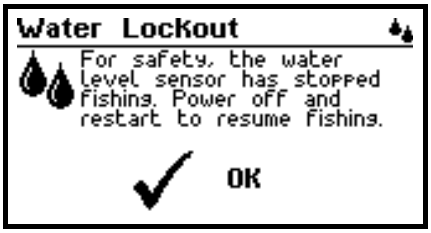
Fishing may only be restarted by powering down and resetting the system using the Stop and Reset buttons.

7.13.2.Immersion Sensor

The immersion sensor is located on the bottom of the backpack. To minimise risk of damage and failure, it uses optical technology to determine when it has been submerged.

When powered up, the backpack will allow normal fishing to commence while the sensor is not submerged.

When the sensor becomes submerged, fishing will be permanently disabled, an error message and status icon (💧) displayed.



Fishing may only be restarted by powering down and resetting the system using the Stop and Reset buttons.

Always ensure the immersion sensor is not covered and free from mud, dirt and other detritus that may prevent its correct operation.

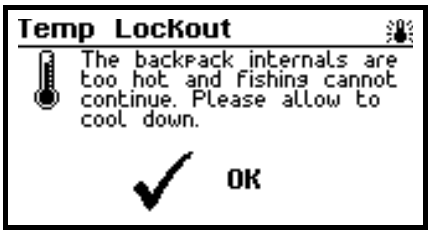
7.13.3. Internal Temperature Sensor

Using the fishing system with large power outputs, or on hot days in direct sunlight, may cause the internal temperature of the backpack's control system to rise.

An internal temperature reading is provided on the "Fishing Setup" and "Fishing Status" display screens, and a warning will be displayed if the temperature rises to a level where the system would benefit from a period of inactivity and cooling (typically at 50°C).

If the temperature reaches the maximum working limit for the internal circuitry (typically at 60°C), the backpack will shut down fishing and display and warning message.

Fishing may only be restarted by powering down the system, waiting for a cooling to occur (typically back to 50°C) , then resetting the system using the Stop and Reset buttons.



7.13.4. Battery Low and Battery Flat Indicators

Typically, the 7.5 Amp-Hour (Ah) battery modules will provide about 1 hour of continuous fishing when delivering 150 Watts of power.
Larger voltages or higher conductivity water will discharge the battery more rapidly.

The battery voltage and estimation of battery capacity (in percent) is provided on the "Fishing Setup" and "Fishing Status" display screens.

When the battery is discharged to 21V, a "Low Battery" warning will be issued, indicating that you should prepare another battery module if you want to continue fishing.

When the battery is discharged to 20V, fishing will be shutdown and a "Flat Battery" error will be displayed. At this point you should replace or recharge the battery pack.

Fishing may only be restarted by powering down the system, changing the battery, and then resetting the system using the Stop and Reset buttons.

7.14. Audible Tones

During fishing activity, the internal audible buzzer will produce various tones to indicate to the operator and any surrounding personnel that fishing is in progress.
Different tones are used to indicate to the operator the status of fishing and if any errors have occurred.
The generated tones represent…

- **Fishing** – slow pulsed mid-pitch tone.
- **Fishing & Current/Power Limiting** – pulsed mid-pitch tone with high pitch chirp.
- **Fishing & Non-critical Error** – fast pulsed low-pitch tone.
- **Critical Error** – continuous low-pitch tone.

8. CARE OF YOUR FISHING SYSTEM

8.1. Operational Care

In addition to the points highlighted in the "Safety Considerations" section (see page 8), please observe the additional precautions…

- Do not operate the product near a source of heat that may cause the operational temperature parameters to be exceeded, or stack other heat generating equipment on top of the unit.
- Only the main fishing Backpack, Battery Pack, Anode and Cathode assemblies have a water-resistance "IP" rating. Avoid prolonged submergence of the equipment under water, and do not expose any other components of your fishing system to water.
- Do not submerge the Battery Pack when it is not fitted to the Backpack.
- Avoid getting water, mud or other detritus in the Anode and Cathode connector assemblies.
- Do not let sharp objects pierce or damage the graphical display screen.
- Make sure the product is more than 1m away from any other appliance that may be susceptible to electromagnetic interference.

8.2. Maintenance & Cleaning

When you have finished using your E-Fish electro-fishing backpack, you should…

- Power down and disconnect the battery pack from rest of the system before attempting any maintenance or cleaning.
- Remove any weed, or other detritus, from the Anode Ring, Anode Pole and Cathode Wire, that may have been collected during its operation.
- To prevent corrosion, marine growth and damage to components, rinse parts of the Anode and Cathode and Harness with fresh water, if they have been used in muddy environments or salt-water. Avoid getting water onto the electrical contacts of the connectors.
- Wipe, with a damp cloth, any mud or salt-water spray that may have inadvertently settled on the surface of the Backpack housing, cabling or connectors.
- If possible manually dry, or allow any remaining moisture time to evaporate before putting the unit into storage.
- Fully charge the battery pack after to use, to maximise lifetime.

Additionally please observe the following precautions for cleaning and maintenance…

- Do not clean with solvents, and only use a damp cloth on the exterior of the unit.
- Do not undertake maintenance of the unit, outside the scope of that defined within this manual, unless instructed to do so by E-Fish (UK) Limited technical support personnel.
- Do not insert extraneous object (metal or other alien substance) into the unit or any of its connector apertures.

8.3. Storage

When storing or shipping your E-Fish electro-fishing system, please observe the following…

- Avoid excessively bending or kinking any of the cable assemblies (below a radius of 50mm), as this could reduce its operational life and cause failure of the insulation.
- Do not store the unit in direct or strong sunlight, as this may perish the cable insulation plastic housing and other rubber mouldings.
- Avoid excessive and large fluctuations in temperature.
- To prevent corrosion, remove any salt or other residues from the product before storage.
- Manually dry, or allow any moisture on system components to evaporate naturally before placing the product into its storage and transit case.
- Ensure no point-load is exerted on keypad, reset button or display screen, as this may cause long term damage to occur.
- Always disconnect the battery pack from the backpack before storage.
- Ensure that the batteries are fully charged after each use and before being put into storage.
- If batteries have been in storage for a prolonged period, ensure they are charged at least once every 6 months.

8.4. Servicing

You should maintain your electro-fishing equipment properly and check it for mechanical and electrical defects at regular intervals.

Service intervals may be related to the degree and conditions of use, but should generally not be…

- Longer than three months for electrical safety checks.
- Longer than twelve months for a full service.

The electro-fishing backpack contains a self-test diagnostic feature (accessible through the menu system) that can be used to perform operational and output tests. However, this should not be use to perform safety checks, which should be undertaken by a suitable qualified and competent person with the correct test equipment.

You E-Fish electro-fishing system is supplied with a complimentary 12-month service included. Subsequent services are available individually or through a maintenance plan – for further details please contact E-Fish sales.

To organise your service, please contact Technical Support (at the contact details given on page 57) and obtain an RMA number before shipping the system back to us in its transit case. The cost of shipping is included with the service, and E-Fish will organise a courier to collect the system from your premises (mainland UK only, other locations may incur and additional shipping charge).

8.5. End Of Life Disposal

When your fishing system reaches the end of its operational life, if you wish E-Fish can organise the disposal and recycling of its component parts at no additional cost (excluding shipping).

To use this service, please contact Technical Support (at the contact details given on page 57) and obtain an RMA number before shipping the system back to us.

To protect our staff and other third parties during the disposal process, please notify us if your system has been used in any contaminated conditions (i.e. sewerage works, chemically contaminated water, etc.), and provide a suitable certificate or statement of decontamination.

9. PROBLEMS & SUPPORT

9.1. Troubleshooting

Below is a table of common problems and solutions, but if you have a problem that cannot be solved from the table below, or an issue that is not covered, please contact E-Fish Technical Support - see page 57 for further details.

Problem…	**Solution(s)…**
I get an "Immersion Error", but my backpack isn't in the water	Check the immersion sensor is not covered by any mud or dirt that may be causing a false reading. Clean with a damp cloth if required.
I cannot power up the system, there appears to be no power.	It may sound obvious, but check you are using a fully charged battery. Old batteries may self discharge quickly when not used. Check the battery connectors have not been damaged and mate correctly with the battery pack. Check there is no mud or other obstruction in the battery pack sockets that may be preventing a good electrical connection. If all of the above are ok, then a fuse in either the battery pack or backpack may have blown. Contact E-Fish Technical support for further details.
The system is connected and powered, but does not appear to have any effect on fish.	Check all the system connections, and there is no mud or other obstruction in cathode and anode connectors. Check you are using sufficient voltage and power-limiting for the current water conductivity. Check the "Status" screen is displayed when the anode trigger is pressed. Perform a system Self-Test using the menu interface to check the electronics is functioning correctly. If you have an electrical continuity tester, disconnect the anode and cathode from the backpack and test for electrical continuity from the central connector pins to the anode ring and cathode wire accordingly. If all of the above are ok, please contact E-Fish Technical support for further details.
Output voltage is not what I've set	If when fishing, the reported output voltage is very different from your desired value, it may be that power-limiting is in operation. From the "System" menu, try increasing the power limit. Perform a system Self-Test using the menu interface to check the electronics is functioning correctly.
No Frequency or Voltage display on the screen	This indicates there could be an internal connection problem between electronics modules. Please contact E-Fish Technical support for further details.
Self-test fails	This indicates there is a potential problem with the internal

	power supply. Please contact E-Fish Technical support for further details.
Fishing measured power is zero	If no power is measured, then there is no electrical current flowing from the anode to the cathode. Check all the system connections, and there is no mud or other obstruction in cathode and anode connectors. Visually check the cable looms on the anode and cathode for defects. If you have an electrical continuity tester, disconnect the anode and cathode from the backpack and test for electrical continuity from the central connector pins to the anode ring and cathode wire accordingly. If all of the above are ok, please contact E-Fish Technical support for further details.
Nothing happens when I press the trigger (no buzzer sound is heard or other activity seen)	Check that the "Fishing Setup" display has changed to the "Fishing Status" display. If it doesn't it is likely that the anode trigger button is defective. Check all the system connections, and there is no mud or other obstruction in cathode and anode connectors. If all of the above are ok, please contact E-Fish Technical support for further details.

9.2. E-Fish Website

Visit "www.e-fish.co.uk" for the on-line home of the E-Fish product family. From here you can get the latest product news, download electronic copies of the documentation, additional contact details and further information on servicing, reconditioning, spares and repairs.

9.3. Technical Support

If your E-Fish fishing system is not operating as expected, we would suggest that you first consult the "Troubleshooting" section of this manual (page 55) to see if the problem can be easily remedied.
If you need further support, you can contact us at…

- Web — www.e-fish.co.uk/support/support.htm (for access to on-line resources and a support request form)

- Email — support@e-fish.co.uk

- Post — E-Fish (UK) Ltd, c/o Holker School, Cark in Cartmel, Grange over Sands, Cumbria, LA11 7PQ, UK

- Call Us — +44 (0)15395 58555 (9:00am to 5:00pm, Monday to Friday, UK time-zone)

For all of the above please provide the following information, where appropriate and if possible, to help us with your technical support request…

- Part and Serial Numbers of the system components. These are located on the labels of each item.
- Version number of the firmware your backpack is using – this is shown on the "Welcome Screen" below the E-Fish logo when the backpack is powered up.
- Any additional information relating to the purchase of your product, such as date or purchase order number.
- To protect our staff. please notify us if your system has been used in any contaminated conditions (i.e. sewerage works, chemically contaminated water, etc.), and provide a suitable certificate or statement of decontamination if applicable.

If you have to return your E-Fish product for servicing or repair, please…

- Contact us (using the details above) for a "Returned Materials Authorisation" (RMA) number before sending your system.
- Pack your system back in the original packaging (or other suitable container), and include written documentation including your contact details (including contact phone number), the RMA number and a description of the problem and any symptoms occurring.
- If your product is still under warranty, please include a copy of your receipt (showing proof and date of purchase).
- Please return the product back to E-Fish (UK) Limited, using an insured courier and with delivery confirmation.

9.4. Limited Warranty Policy

E-Fish (UK) Limited (herein after referred to as E-Fish) warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

The system warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

Conditions…

These include, but are not limited to, the following:

1. The warranty is only deemed to be valid if the equipment was sold through E-Fish or one of its approved distributors.
2. The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
3. The warranty is not transferable.
4. E-Fish must be notified immediately (in writing) of any suspected defect and if advised by E-Fish, the equipment subject to the defect shall be returned by the customer to E-Fish, via a suitable mode of transportation and shall be freight paid.
5. The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures, or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is out with the control of E-Fish.
6. The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
7. The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
8. Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by E-Fish.
9. The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from E-Fish.
10. E-Fish retains the sole right to accept or reject any warranty claim.
11. Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and E-Fish notified of the damage.

Please note…

- E-Fish reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.
- If the equipment is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.
- Any customer acceptance testing (if applicable) must be performed at either the E-Fish

premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

9.5. Spares

Please note that the majority of parts on your fishing system are NOT designed to be user serviceable. If your equipment is under warranty or a service contract, it should be returned to E-Fish for inspection and repairs (see "Servicing" on page 53 for information about E-Fish annual maintenance and service contracts).

Do not attempt to undertake repairs to the equipment yourself as this may compromise the safety of your fishing system, instead please contact E-Fish Technical Support to discuss your repair requirements further.

However, some perishable spare parts are available for your fish system, including…

- Replacement anode rings.
- Replacement cathode wires.
- Replacement harness.
- Replacement documentation.
- Replacement or additional battery packs (various weights and capacities).
- Blanking plugs for the Battery Pack sockets.
- Blanking plugs for the Backpack Anode and Cathode plugs and sockets.
- Battery pack reconditioning service.

For a full list of spare parts and accessories please visit the E-Fish website or contact E-Fish Sales to discuss your requirements.

10. NOTICES

10.1. Copyright Notice

10.2. Disclaimer

Neither E-Fish (UK) Limited or their affiliates shall be liable to the purchaser of this product, or third parties, for losses, costs, damages or expenses incurred by the purchaser or third parties as a result of accident, misuse, abuse, modification of this product or a failure to strictly comply with the operating and maintenance instructions.

10.3. Trademarks

Other organisation, product and brand names used within this document are for identification purposes only. E-Fish (UK) Limited disclaims any and all rights in those marks.

Specifications and information contained in this document is subject to change without notice, and does not represent a commitment on the part of E-Fish (UK) Limited.

10.4. Content

Due to the expansion of equipment capabilities and the fact that new products are continually being introduced, this manual cannot detail every aspect of the product operation, and the latest version can always be downloaded from the website.
All information in this document is believed to be correct at the time of going to press, however E-Fish (UK) Limited cannot be held responsible for any inaccuracies or omissions. If you find an error or feel we have missed important or useful information, please contact us.

10.5. Handling Recommendations

The E-Fish system contains sensitive electronic components that may be damaged by an Electrostatic Discharge (ESD) if handled incorrectly. To minimise risk, avoid dismantling the unit, touching any exposed electrical contacts on external connector, or inserting anything other than the recommended cabling into the connectors.

10.6. Waste Electrical & Electronic Equipment Statement

E-Fish UK Limited is very aware of its responsibilities to the environment and to the sustainability of the resources of our planet.

Under the European Union (EU) directive on 'Waste Electrical & Electronic Equipment' (Directive 2002/96/EC), from August 13, 2005, products categorised as electrical or electronic equipment cannot be discarded as municipal waste by placing in landfill, dumping in the sea or incineration. SEPARATE collection is mandatory.

At the end of its life, you should either return this system and its associated leads & accessories (if appropriate) to E-Fish (UK) Limited with a certificate of decontamination (we reserve the right to protect our staff from the effects of any contamination) or it should be sent to an appropriate treatment or recycling agency.

Please refer to the section “End Of Life Disposal” (on page 54) for further details.

10.7. Restriction of Hazardous Substances Statement

Under the European Union (EU) directive on the 'Restriction of Hazardous Substances' (Directive 2002/95/EC), from July 1, 2006, electrical and electronic equipment cannot contain lead ("lead free"), mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

All components of electro-fishing systems, sold by E-Fish (UK) Limited, fully comply with this legislation where applicable.

11. INDEX

Fish Survey Solutions

UM-115-P00169-04
P/N: EF00169.4
March 2012