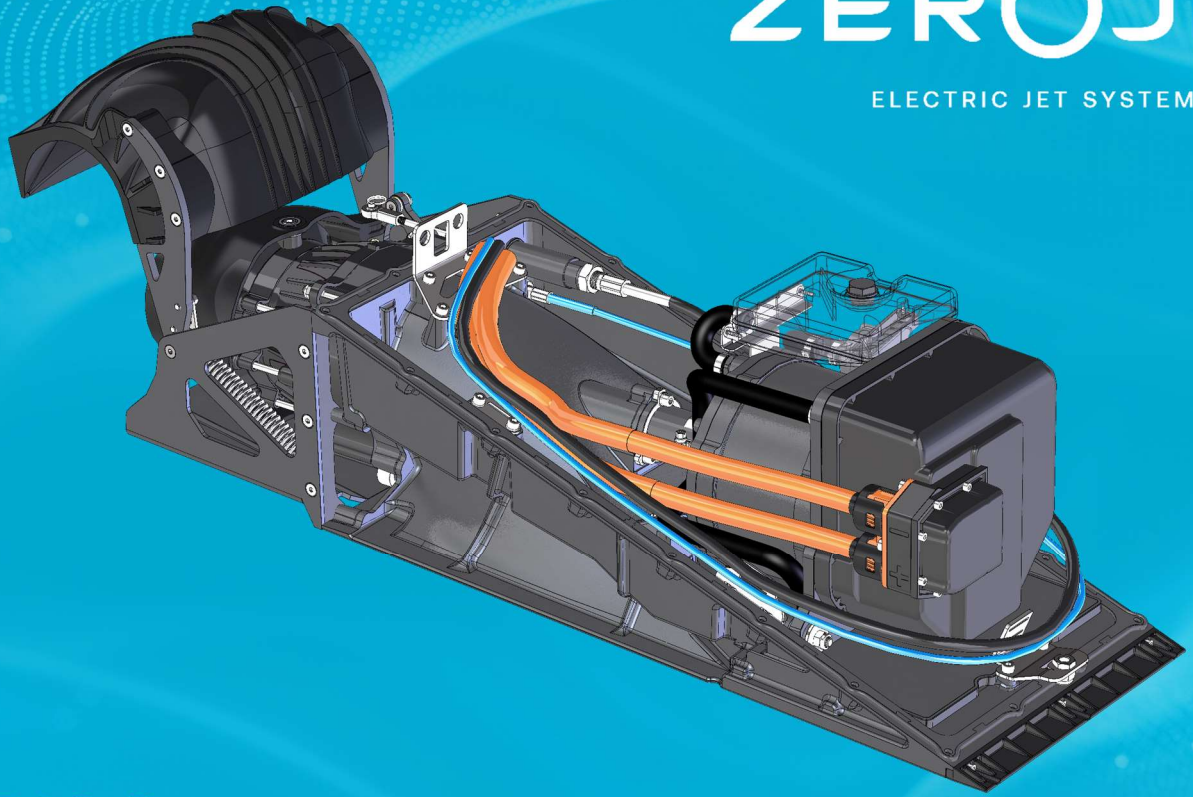
ZEROJET

ELECTRIC JET SYSTEMS



ZJ20 User Manual

1 FOREWORD

Dear Customer,

Congratulations on purchasing the ZeroJet electric jet propulsion system and welcome to the ZeroJet tribe! We are immensely proud of this product and its performance, and we have big plans to continue to add new features and accessories as we develop them. As part of our on-going development, we welcome your feedback and ideas and would love to hear from you. Please feel free to reach out and give us feedback at hello@zerojet.com and register your product to be kept informed of new upgrades and products.

We hope you enjoy your ride and stay in touch!

Kind regards,

Mark Robotham

CEO at ZeroJet

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3 INTRODUCTION

Thank you for choosing a cutting-edge ZJ20 electric jet propulsion system for your new tender.

This manual has been created to help you operate your ZJ20 propulsion system safely with the minimum of hassle.

It contains details about the system and information on its operation, maintenance, and safety precautions. It is recommended that each operator read this manual carefully to familiarise themselves with the ZeroJet system before charging and operation.

To ensure a long lifecycle, ZeroJet recommends that you perform the checks, maintenance and charging procedures outlined after the general instructions in this manual. Please note this manual is not a comprehensive workshop technical guide. In case of any difficulty, or if you have any questions regarding the operation or maintenance of your electric jet, please contact ZeroJet directly.

Only suitably qualified and experienced personnel should undertake the maintenance, repair, or modifications to your boat & ZeroJet system. Modifications that may affect the safety characteristics of the electric system or batteries should be assessed, executed, and documented by suitably qualified and experienced personnel. ZeroJet cannot be held responsible for modifications that have not been approved by us in advance.

Please keep this manual in a secure place, and hand it to the new owner if the craft is sold.

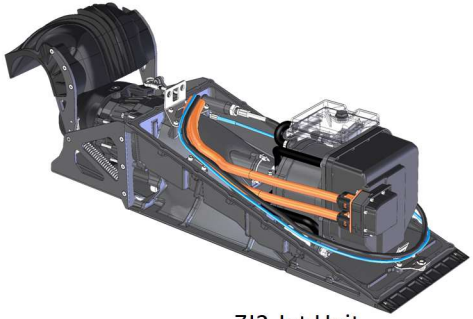
4 SCOPE – SYSTEM TYPES

The following ZJ20 control variants are covered by this document:

- ZeroJet T20 – ZJ20 with tiller control input
- ZeroJet C20 – ZJ20 with side mounted throttle and steering wheel input

The following battery options are covered by this document:

- ZJ20 10kWh battery single pack
- ZJ20 5kWh split-pack option



ZJ2-Jet Unit



T20 – Tiller Option



C20 – Console Option



ZJ20 5kWh Battery Split Pack



ZJ20 10kWh Single Pack

5 IMPORTANT SAFETY INFORMATION

5.1 SYSTEM INSTALLATION

The ZJ20 system should be installed by suitably qualified and experienced personnel in line with guidance provided by ZeroJet. Contact ZeroJet prior to attempting any installation works.

5.2 OPERATOR RESPONSIBILITY

It is the operator's responsibility to provide the necessary safeguards to protect people and property, to know how to stop the system quickly in case of an emergency and to understand the use of all controls.

- Be sure that anyone who operates the ZeroJet system receives proper instruction in its operation.
- Operate your craft at a safe speed according to weather, sea conditions and local regulations.
- Do not apply throttle when someone is in the water behind the jet, or when a passenger is climbing aboard.
- Keep hands and feet well clear of any moving parts associated with the propulsion unit, including the reverse bucket.
- Keep clear of the immediate jet flow as water under high pressure is dangerous.
- Attach the emergency tether securely to the operator throughout operation of the vessel.
- Always stop the motor if you leave the controls for any reason.
- Always wear a personal floatation device (PFD) while aboard the craft.
- Do not operate the system if the system has suffered damage or other functional impairment occurs.
- Do not attempt to modify the ZeroJet system or the ZeroJet battery packs in any way. Doing so will void the warranty and may lead to serious injury or death.

5.3 SAFETY INSTRUCTIONS

This manual uses the following symbols to distinguish important safety information. Obey all safety messages that follow these notices to avoid damage to the system or possible injury or death.

⚠WARNING	Indicates a hazard which could result in death or serious injury if not avoided.
⚠CAUTION	Indicates a hazard that could result in minor or moderate injury if not avoided.
NOTICE	Damage to your motor, property, or the environment may result if instruction is not followed.
TIP:	Key information to make procedures easier or clearer

6 TECHNICAL DATA

Maximum input power	16.8 kW (Limited to 13.2kW with 5kWh pack)
Rated voltage	47-56 V_{DC}
Maximum impeller RPM	3500 RPM
Impeller rotation	Anti-Clockwise (Viewed from stern)
Jet thrust nozzle angle	± 25°

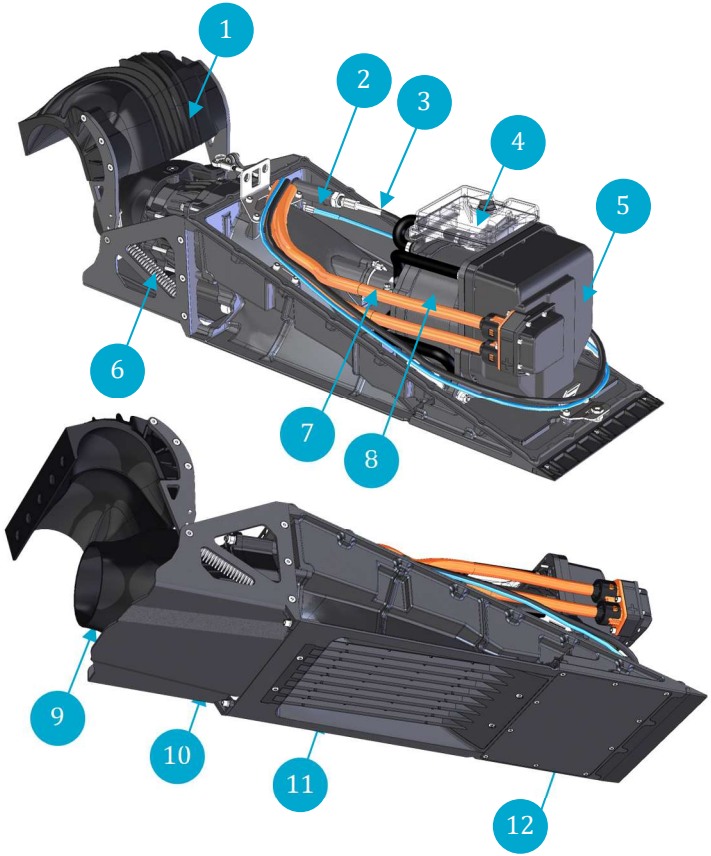
System weights	Jet unit: 43kg 10kWh Pack: 103kg 5kWh Pack: Master – 29kg Slave – 27kg
Cooling system	Isovoltine, recommend: Total Isovoltine P2
Battery chemistry	LiFePO4
Battery capacity	10kWh pack: 210Ah 5kWh pack: 105Ah
Maximum charge current	100A
Recommended charge current	≤80A

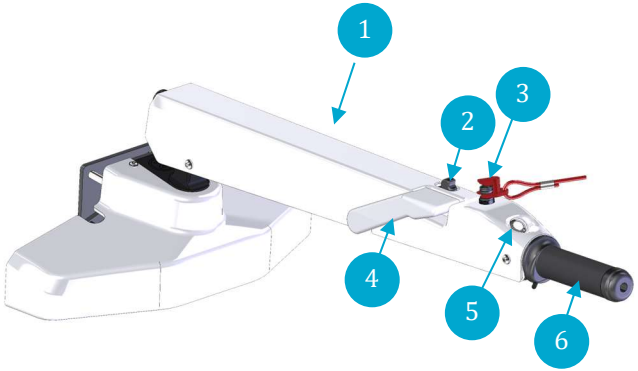
7 SYSTEM MODULES

7.1 JET UNIT

The dynamic element of the ZJ20 system is the jet unit, which provides propulsion, steering and reverse.

1. Reverse bucket
2. Reverse cable link
3. Steering cable link
4. Coolant tank
5. Electronic Speed Controller (ESC) Housing
6. Reverse bucket return spring
7. High current drive cables
8. 15kW Electric motor
9. Jet flow director (Steering nozzle)
10. Ride plate
11. Jet intake/ intake grate
12. Heat exchanger
13. Cooling pump – not shown, below cooling tank





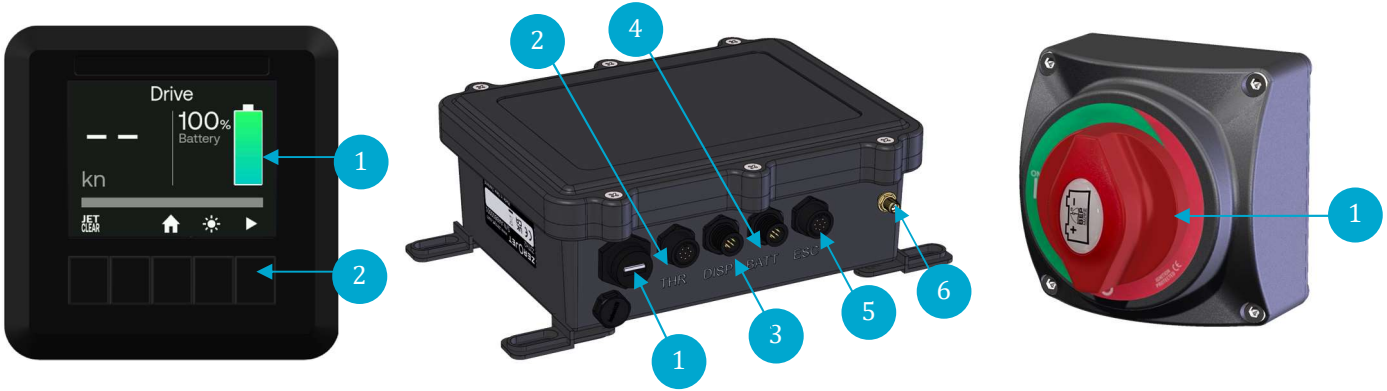
7.2 SIDE MOUNTED THROTTLE CONTROLS

1. Throttle handle
2. Neutral lock tab
3. System activation button
4. Emergency tether
5. Data cable
6. Reverse cable

7.1 TILLER CONTROLS

1. Tiller height adjustment
2. Reverse lock tab
3. Emergency tether
4. Reverse bucket handle
5. System activation button
6. Throttle





7.3 DISPLAY

1. Display screen
2. System control buttons

7.4 SYSTEM HUB

1. USB Input
2. Throttle connection
3. Display connection
4. Battery connection
5. ESC connection
6. GPS aerial

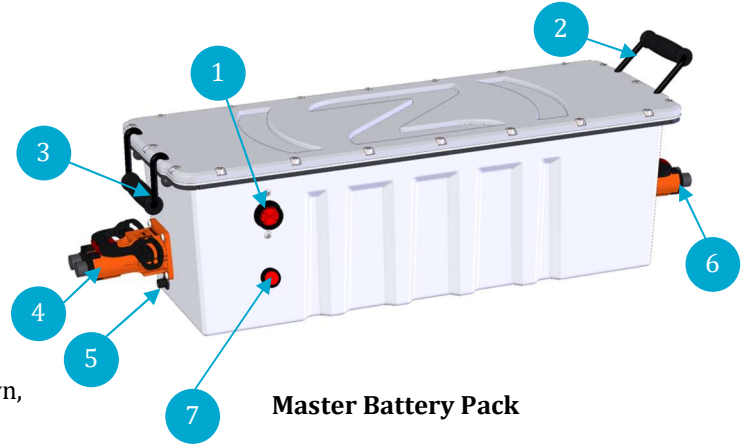
7.5 ISOLATOR SWITCH

1. Rotary switch input (lockable with padlock)

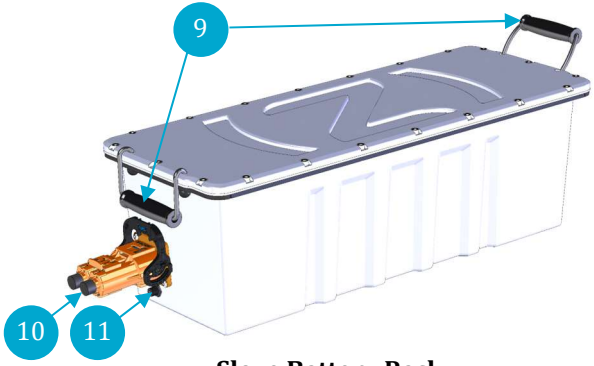
7.6 BATTERY CONNECTIONS – 5KWH

Master Battery

1. Charge socket
2. Pack carrying handle
3. 48V Auxiliary and fuse (behind handle)
4. 48V connection to Jet unit
5. Signal cable connection to jet unit
6. 48V connection to slave pack
7. Battery on/off switch
8. Signal cable connection to Slave pack (not shown, below 48V connection to slave pack)



Master Battery Pack



Slave Battery Pack

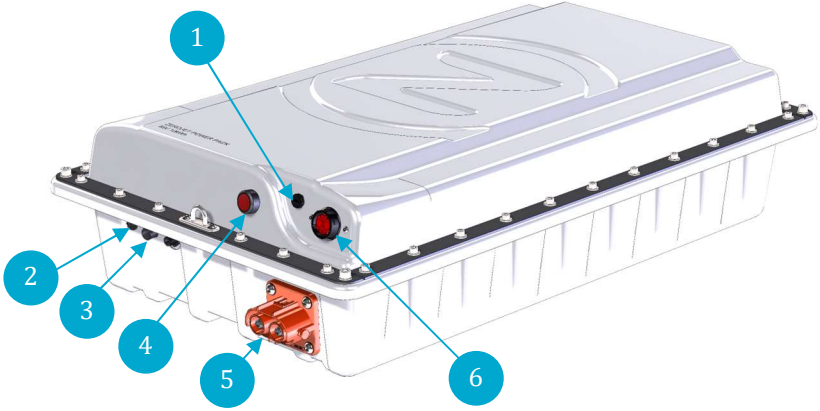
Slave Battery

9. Pack carrying handle
10. 48V connection to Master Battery pack
11. Signal cable connection to Master pack

7.7 BATTERY CONNECTIONS – 10KWH

10kWh Battery

1. Pack breather vent
2. 48V Auxiliary fuse
3. 48V Auxiliary outlet socket
4. Signal cable connection to jet unit
5. Battery on/off switch
6. 48V connection to jet unit
7. Charge inlet



10kWh Battery Pack

8 SYSTEM STATES

Your ZeroJet system has seven defined states:

1. **Battery Storage:** The system's lowest power state, with only essential safety systems active. While it's suitable for storing the system in this state whenever not in use, it is recommended for prolonged periods of inactivity to preserve battery health.
2. **Battery Ready:** The battery control module is active and ready for use. It is not advisable to keep the system in this state for extended periods to prevent battery drain and potential damage.
3. **Sleep:** The system is in a low-power state but ready to be fully activated from the helm console.
4. **Standby:** The system display is powered on, the main power contactors are closed, and the auxiliary port is active, preparing the system for immediate use.
5. **Drive:** The throttle is engaged, and the system is fully operational. Time to enjoy your drive!
6. **Charging:** When connected to a charger, the system's drive functions are disabled. Once the charger is powered, the system enters charge mode, and current begins to flow to the battery.
7. **Charge Float:** The system remains in charging mode, but as the battery is fully charged, the input current is reduced to zero to maintain the battery at full capacity without overcharging.

The table below gives an overview of factors governing which state the system is in. Section 9 gives detailed advice on system operation.

System Control	System State						
	Battery Storage	Battery Ready	Sleep	Standby	Drive	Charging	Charge Float
Battery On	✗	✓	✓	✓	✓	✓	✓
Isolator Switch On	•	✗	✓	✓	✓	✓	✓
Safety Lanyard Connected	•	•	•	•	✓	•	•
System Activation Button[1]	•	•	✗	✓	✓	•	•
Charger Connected	•	•	•	•	✗	✓	✓
Charger Powered	•	•	✗	✗	✗	✓	✓
Battery Full	•	•	•	•	•	✗	✓

Condition must be met	✓
Condition must not be met	✗
No effect if other conditions are met	•

[1] A single press of the system activation button will move the system from sleep to standby. Further presses will cycle between standby and drive modes. Holding the button for 3 seconds will take the system back to sleep.

9 SYSTEM OPERATION

This section covers safe and proper use of the ZJ20 propulsion. The principles of operation remain similar between all variants of ZJ20 propulsion systems, where details of controls differ between variants, this is noted below.

9.1 PRE-OPERATION CHECKS

9.1.1 GENERAL CHECKS

1. Check battery packs are secured with the provided retaining straps to prevent movement & damage. Adjust and tighten straps as necessary.
2. Ensure the batteries are fully connected:
    a. 5kWh split pack:
        i. 48V cable (Isolator switch to Master, Master to Slave)
        ii. Signal cable (Hub to Master, Master to Slave)
    b. 10kWh single pack
3. Ensure the battery on/off switch is in the on position (depressed).
4. Disconnect the charging cable from the charge inlet.
5. Perform inspection checks listed in Section 12.15.
6. Before launching, check for and clear any debris or obstructions that may be sucked into the jet.

NOTICE

Do not turn the system on if there is visible or suspected damage to the components or cables.

⚠CAUTION

Never operate you system isolator switch while the motor is rotating. Operating the switch while under high load may result in damage to your system.



9.1.2 CHECKING THE STATE OF CHARGE

It is important check the battery state of charge prior to use and to monitor it throughout use. A display of the battery status is available on the system control screen.

The display simultaneously displays the following information:

1. System state – Accessory, Drive, or Charge mode
2. Power meter
3. Battery charge percentage
4. Speed in knots – derived from GPS

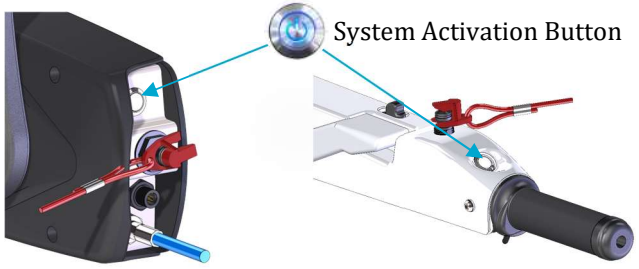


⚠CAUTION

Numerous factors can affect the boat's range, including external conditions and load which cannot be accounted for. You should allow for a margin of error for longer expeditions.

9.2 POWER SYSTEM ON

1. Turn the battery on:
    - 5kWh packs have the battery on/off switch located on the master pack.
    - 10kWh packs have an on/off switch in a location set by the boat manufacturer - check your vessel user manual for details.
2. Turn system main isolator switch (if a padlock is in position, remove prior to operation). The system will change its state from 'off' to 'sleep mode'.
3. Press the activation button to enter standby mode (see '1' below).



9.2.1 EMERGENCY TETHER ATTACHMENT

⚠WARNING

The emergency tether cord clip should always be attached to the operator's lifejacket, clothing, or wrist when starting or operating the system.

⚠WARNING

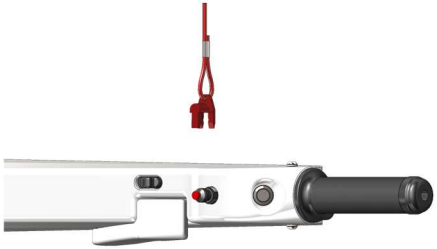
Avoid injury resulting from contact with the rotating impeller and shaft, or having clothing, hair or loose objects drawn into the intake. The intake is located below the waterline forward of the jet outlet nozzle. Keep clear of the intake and never insert anything into the intake or outlet nozzle when the system is on.

9.2.1.1 Stopping in an emergency

To stop the motor in an emergency, pull the emergency tether clip out from the tiller or throttle by pulling on the emergency tether. This will happen automatically if the operator gets too far away from the controls either intentionally, or accidentally.

The power to the motor and motor controller will be cut, stopping the motor instantly. The batteries will disconnect within 3 seconds with an audible click.

9.2.1.2 Tether Location – T20 Tiller Variant



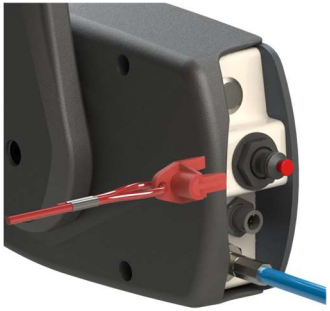
For tiller systems the emergency tether attaches at the throttle end of the tiller.

NOTICE

Test the function of the emergency tether before every trip by removing the emergency tether and ensuring the motor is disabled.

Other options of stopping the motor rapidly are releasing the throttle or turning the batteries off on the system activation switch.

9.2.1.3 Tether Location – C20 Console Variant



For console systems the emergency tether attaches at the aft plate of the side mounted throttle.

9.3 DRIVE CONTROLS

The ZJ20 system is offered with two control options:

- T20 – Tiller control option
- C20 – Console control option

Section 9.3.4 provides guidance for driving with a tiller and section 9.3.5 provides guidance on driving with a console helm (side mounted throttle with wheel steering).

Experiment with steering the boat at low speeds before attempting higher speeds. Unlike a traditional rudder, the boat will not steer without power. Start your turn early and use sufficient power to maintain steerage.

⚠WARNING

Never operate the jet when swimmers are behind the jet or are close to the intake.

⚠CAUTION

When lightly loaded, the jet will allow the boat to accelerate rapidly and suddenly, potentially causing loss of control, falls or ejections. Turn the throttle slowly to minimise sudden acceleration.

⚠CAUTION

Due to the flat-bottomed nature of jet boats and lack of rudder or propeller skeg, the boat will tend to sway, or skid sideways on fast turns. If you attempt to turn too tightly at high speeds, the boat could spin out. This may cause an overloaded or unstable boat to roll or potentially capsize.

TIP: Operating at low speeds (3-4 knots) will draw the least current from the battery and give the longest run time. Where range is a concern, it is not recommended to operate at speeds where the boat is at a steep angle; this leaves a large wake and draws the highest current per unit distance travelled.

9.3.1 ACTIVATE STANDBY MODE

1. Conduct checks as per section 9.1.
2. Ensure the system is powered on per section 9.2.
3. Press the system activation button located on the throttle unit/tiller; this will switch the system from sleep to standby mode. In standby mode the system display will turn on and the system activation button will flash blue.

9.3.2 READY TO DRIVE CHECKLIST

4. In standby mode the display presents a ready to drive checklist[2]. Each item has a status indicator, which may show either red or green. The system will not switch to drive mode until all indicators are green.

TIP: The motor is not operational in standby mode. To drive the boat, transfer to drive mode (see section 9.3.3).

[2] See section 10 for further details on display operation and standby mode.

Item	Action to turn green
Emergency tether	Attach the emergency tether to the system. Before use it is critical to understand operation of the emergency tether – see section 9.2.1.1.
Neutral throttle	Put throttle in neutral -see section 9.3.5.4 (this should be automatic with the tiller)
Charger disconnected	Disconnect the charger from the system
System status	Check the errors log for further details

 - System Activation Button



9.3.3 ACTIVATE DRIVE MODE

5. Once all indicator lights in the ready-to-drive checklist are green, press the system activation button again to switch the system to drive mode.

6. The system activation button will illuminate continuously to show the motor is on and operational. The battery packs will connect with an audible click. The system is ready to drive in line with section 9.3.4 and 9.3.5.

7. Subsequent presses of the button will toggle the system between drive and accessory modes.

8. A long press of the button will transfer the vessel back to sleep mode and will turn off the display.

9. Further details of display screen operation can be found in Section 10.

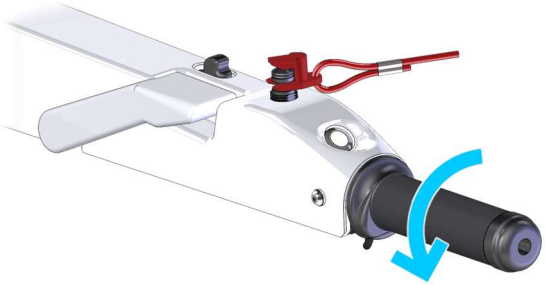


TIP:	A long press of the system activation button while the system is in sleep mode will transfer straight to drive mode.
TIP:	In transferring out of sleep mode, the system undergoes a short (6-10 second) start-up process.
TIP:	The drive will not start if the throttle is engaged. If the motor is initially unresponsive, release the throttle and wait for the start-up process to complete.

9.3.4 DRIVE WITH A TILLER – T20 ONLY

For driving with a console (C20 see section 9.3.5).

9.3.4.1 Throttle - Tiller



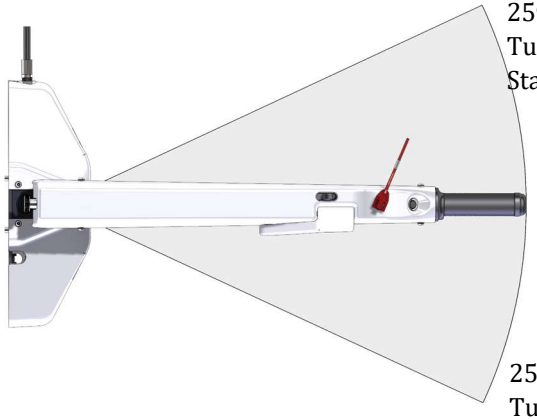
The throttle of the ZeroJet tiller system is an electronic twist grip, like that found on petrol outboards or motorbikes. For forward operation, twist the throttle anti-clockwise.

9.3.4.2 Steering - Tiller

To steer with a tiller, push the tiller side to side, this will cause the boat to steer in the opposite direction from that of the tiller.

⚠CAUTION

The tiller has a range of motion of approximately 50° from lock to lock. Keep this area clear throughout operation to ensure that steering is not restricted.



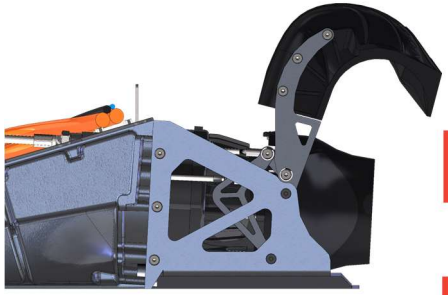
9.3.4.3 Reverse Control - Tiller

Reversing in a jet boat is done using a reverse bucket, which redirects water flow. When the reverse lever is raised, the reverse bucket is lowered into the waterjet flow, deflecting it to discharge forwards and sideways

depending on the tiller angle. This allows the boat to move in reverse and to yaw sideways utilising the throttle in the same manner as forward operation.

⚠CAUTION

To ensure optimal operation, apply no more than 50% throttle while the bucket is lowered. Applying full throttle while the bucket is lowered will cause the bucket to automatically raise.



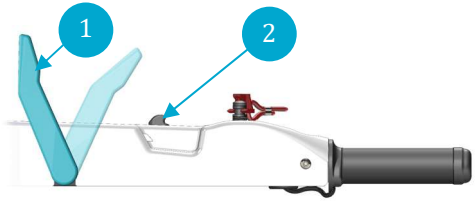
⚠WARNING

No step on jet unit or bucket!

⚠WARNING

Make sure there are no people or obstacles behind you before raising the reverse lever.

The reverse lever (1) is located on the starboard side of the tiller and is held under a catch (2) to prevent accidental activation.



The steering in reverse will be the same as the steering in forwards. i.e., push the tiller starboard to turn the bow port. This is opposite to how an outboard driven boat operates and should be practiced before attempting any difficult manoeuvres.

⚠WARNING

Accidental, or unintended operation of the reverse bucket at high speeds has potential to stop the boat suddenly and violently. After raising the reverse bucket, ensure the lever catch engages fully with the reverse unlock tab to prevent unintended or accidental operation.

9.3.5 DRIVE SIDE MOUNTED THROTTLE – C20 ONLY

For driving with a tiller (T20) see section 9.3.4.

9.3.5.1 Throttle - Console

The side mounted throttle is used to control the thrust of the jet system in both the forward and aft direction. Regions of operation are defined in section 9.3.5.4.

The throttle handle has a neutral lock to avoid unintentional operation, and this will engage automatically when the lever is put in the neutral position.

To disengage the neutral lock, pull the tab on the underside of the throttle lever upward and push the lever forward.

Rotating the lever further aft will engage the motor, driving the boat backwards. The aft operation of the vessel uses a limited power mode.

9.3.5.2 Steering - Console

The side mounted console throttle is paired with wheel steering. Rotating the wheel clockwise will turn the boat starboard and anticlockwise will turn the boat to port.

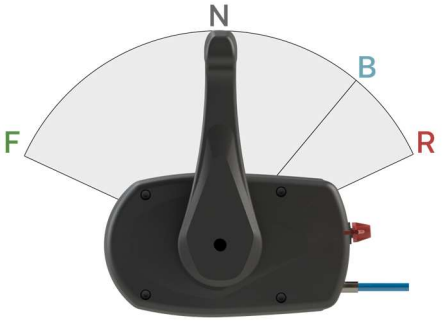
NOTICE

While the power available in reverse is far more limited than in forwards operation, the steering is significantly sharper. This allows the boat to turn in within its own length.

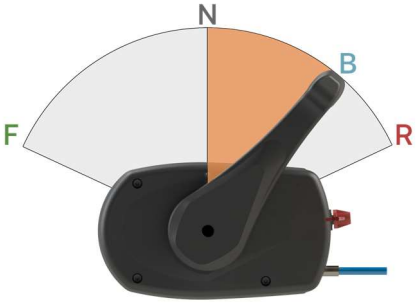
9.3.5.3 Reverse Control – Console

To engage reverse, pull the neutral lock tab upward and pull the throttle lever aft. Moving the lever through the NB section will lower the reverse bucket, no power will be applied by the motor in this section. The throttle will click into the B position.

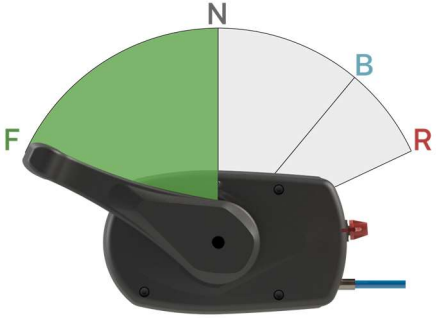
9.3.5.4 Throttle Positions – Console



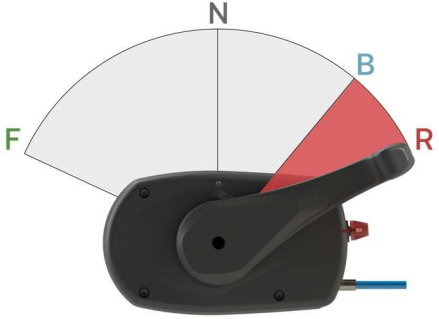
Neutral Position



Reverse Bucket Down Position (motor not engaged)



Power Forward Region



Power Aft Region

9.4 POWER SYSTEM OFF

To power the system off:

1. Ensure the throttle is in the neutral position.
2. Press and hold the system activation button to change the system to sleep mode from any state.
3. Turn the isolator switch to the off position to ensure no accidental operation or discharge.

⚠CAUTION

Never operate the system isolator switch while the motor is rotating. Operating the switch while under high load may result in damage to your system.

5. Remove the emergency tether from the tiller/throttle.
6. Turn the battery off (this step may be completed after each use and is recommended if the system is not likely to be used for a period of 4 weeks or more, see below).

9.4.1 BATTERY ON/OFF SWITCH

As with all battery systems, the ZJ20 batteries undergo a gradual self-discharge process during storage. To mitigate this, each battery incorporates a latching push-button on/off switch. When engaged, the battery is activated and is ready for use. Conversely, when disengaged, the battery enters a deep sleep state, ceasing all non-essential operations. This sleep mode ensures safe longer-term storage, while minimising self-discharge rates. While it is optional to switch off the battery after each use during regular usage periods, it is advisable to deactivate it for any storage period exceeding four weeks.

9.5 POTENTIAL DRIVE CONDITIONS

9.5.1 LOW POWER MODE

To provide reserve capacity and to prevent the batteries from being fully discharged, the system will reduce power into a low power *limp home mode* at **15%** capacity. Below this capacity, the throttle will be limited to 40% power, allowing for a speed of approximately 5 knots.

⚠WARNING

Never switch the isolator off while the motor is under load. This may lead to damage to your system.

⚠CAUTION

Never leave the emergency tether engaged or on the tiller when unattended to prevent accidental or unauthorised use.

NOTICE

Discharging the batteries fully may shorten their lifespan. To protect the batteries, the system will not allow discharge to 0% capacity.

9.6 LOW SOC SHUTDOWN

The battery pack will shut down when the remaining battery capacity (SoC, or State of Charge) reaches 0%. As the remaining capacity is an estimated value, there may still be some available power in the battery. In an emergency the battery can be restarted to use this capacity. To restart the battery after a low SoC shutdown you must perform a hard reset by turning the battery pack off and on again and then waiting 10 seconds before trying to start the boat. The battery will continue to provide power until one of the cells reaches the under-voltage protection limit.

9.7 INTAKE BLOCKAGE

To prevent the jet from ingesting debris or causing bodily harm, it is protected with an intake grate. Smaller items such as weed and rope may slip through this grate and interfere with the operation of the jet, resulting in reduced performance, cavitation, and noisy operation.

The system is provided with a pump reverse function as a first option in the event of blockage. Operation of this feature is covered by section 0.

If the reverse function does not successfully clear the intake, to check and clear the intake, use a 5mm hex key to remove and set aside the 4x M6 fasteners on the underside of the intake.

TIP: It can be handy to keep some form of hook or bent wire in your vessel if being used in particularly contaminated waters as you may be able to dislodge debris without removing the grate.

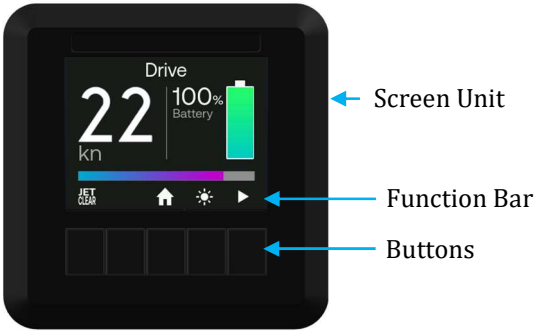
⚠WARNING

Ensure system is turned off, the emergency stop tether is removed from the tiller, and the isolator switch is turn off before removing the grate.

To avoid injury, do not attempt any servicing of the intake, grate, or impeller while the system is operational.

10 DISPLAY SCREEN OPERATION

The ZeroJet system is supplied with a water resistant display for monitoring the system status and displaying any warnings encountered during operation.



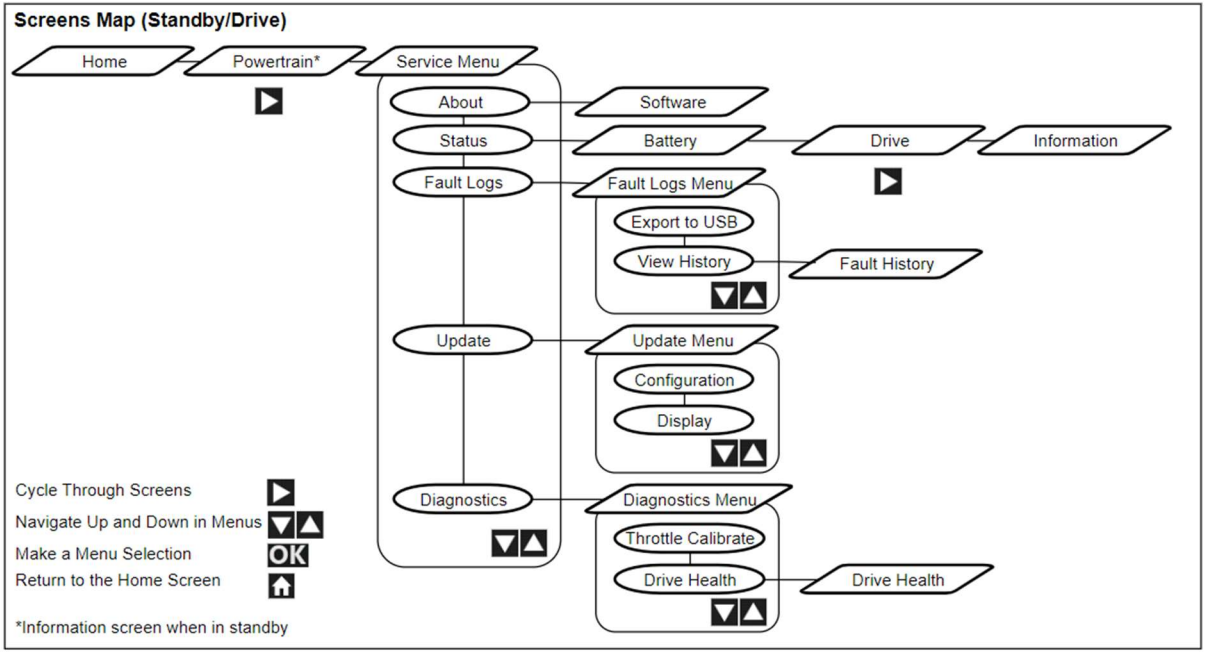
The screen will turn on with the system and display information relevant to the state of the system. The screen is supplied with five buttons for user interaction.

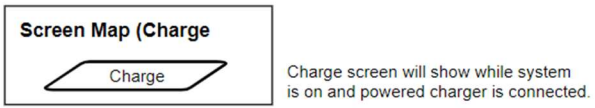
The function of these buttons varies between screens. The current functions are displayed using icons in the function bar on the screen above the buttons.

Icons used to infer button functions are as follows:

Icon	Function
	Home – click to return to home screen at any time
	Navigational Arrows – use to navigate to selections in menu
	
	
	OK Button – use to make menu selections
	Brightness – pressing will cycle through levels of screen brightness
	Jet Clear – press and hold to run jet in reverse to clear blockages
	System Alerts – Shows current errors and warnings
	Boat on/off Switch – change mode/turn on/off (hold for sleep)

10.1 SCREENS MAP





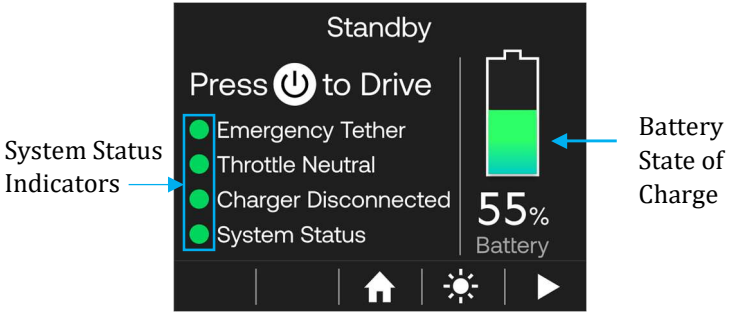
Charge screen will show while system is on and powered charger is connected.

10.2 STANDBY

When turning the system on with a single press of the system activation button (see Section 9.2), the display will show that it is in the standby state. The drive and throttle will be inactive, and the display will show the battery state of charge and the four system status indicators.



In transferring out of sleep mode, the system will take 6-10 second for the display to be fully ready. While undertaking this process, the ZeroJet or boat manufacture's splash screen will be displayed, however the system will be ready to transfer into drive mode after only 1-2 seconds (see section 0).



System Status Indicators will show either green or red and to engage drive mode all system status indicators must be green. If any of the indicators show red, the following actions can be taken:

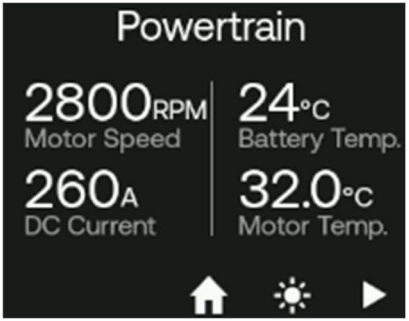
- Emergency Tether – Insert the emergency tether to the tiller or throttle (see section 9.2.1).
- Throttle Neutral – Ensure the throttle is in a neutral position.
- Charger Disconnected – Ensure the charge cable is not plugged in to the charge port.
- System Status – Red indicates an active system error – Proceed to fault history for more details on the fault

10.3 DRIVE

When the start button is pressed a second time, if the status conditions outlined in section 10.2 are met, the system will move to drive state and the motor and throttle are enabled and ready for use. The main screen of the display will display immediately relevant information: the power, state of charge, speed, and runtime Pressing left or right will show additional information in the powertrain screen.



Drive Screen

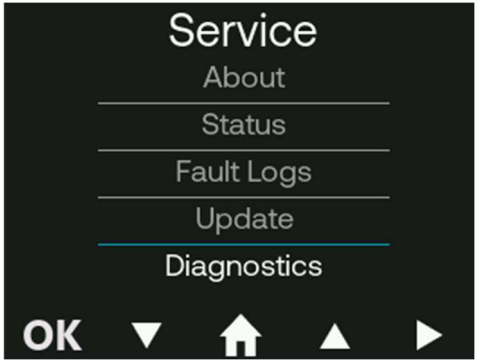


Powertrain Screen

10.4 CLEARING A BLOCKAGE - PUMP REVERSE

The jet unit is supplied with an intake grate to minimise debris ingress into the pump. On occasion, debris may make it through the grate leading the pump to require clearing. For this situation a pump reverse function is provided to spin the pump in the opposite direction and clear any blockages. To run this function, while in drive mode hold the button below the 'R' symbol. The pump will run backwards for the duration of the button press.

JET CLEAR



10.5 CHECKING SOFTWARE TYPES

To ensure the best user experience, it is recommended that you keep your ZJ20 software up to date. You can check your current software version through the information screen on your system display:

1. Navigate to the Service screen.
    a. From home, press the right arrow key twice.
2. Select the “About” option.

Press the right arrow key until the “Information” screen is shown.

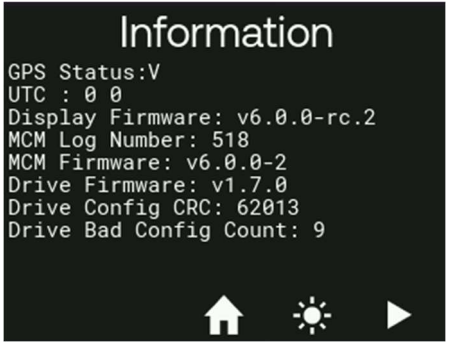
TIP: To check and download the latest software issue go to www.zerojet.com/downloads

TIP:

If you experience an issue with your system, we kindly recommend checking that your device is updated to the latest firmware version before reaching out to the ZeroJet help desk. This may help resolve the issue more quickly.

10.6 SERVICE SCREEN

Available in both drive and accessory state, settings are navigable with the up and down buttons then OK to make your selection. The screens available give various information about the vessel.



Information Screen



10.7 FAULT LOGS

10.7.1 ALERT LEVELS

The ZJ20 system is self-monitoring and will alert the user of relevant information during use. The system has three levels of alert:

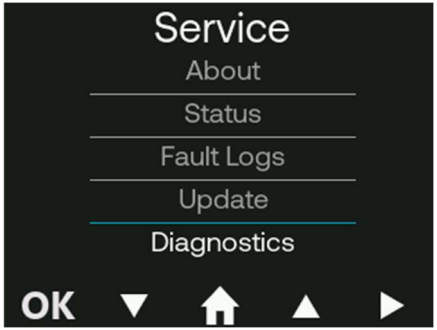
1. Information: May be useful to the driver in planning their trip.
2. Warning: Warnings alert the user of system parameters nearing their limits of operation. Warnings may advise user action to optimize the use of their system.
3. Fault: The system has encountered a problem serious enough that it must deactivate drive mode. The system will not be able to reenter drive mode until the fault has been rectified.

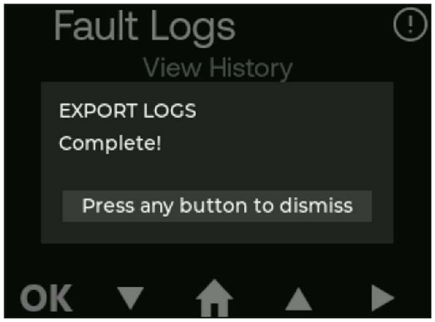
10.7.2 CURRENT ALERT INFORMATION

While a current alert exists, the system alerts symbol will show on the system home screen.

Warning

Error





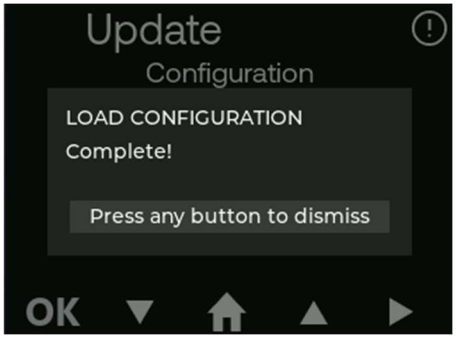
10.8 EXTRACTING LOGS FROM THE SYSTEM

Certain exceptional circumstances it may required that the ZeroJet system logs are reviewed. Extracting the logs is possible utilising an 8-16GB USB memory stick:

1. Turn the system on and ensure it is in standby mode
2. Navigate to the fault logs menu, located on the service screen
3. Check the fault history and note and error codes shown
4. Remove the protective cap from the system hub USB port
5. Plug the USB memory stick[3] into the system hub
6. Select “Export to USB” on the fault logs screen
7. Available logs will be uploaded to the USB, this process will take a few seconds, confirmation of completion will be shown on the display

Note: The sooner this process is completed after an error is detected, the more valuable the collected information will be.

[3] The USB drive must be formatted to FAT32 for the system to recognise it. If the drive is not in FAT32 format, it can be formatted to this standard by using a computer.



10.9 SOFTWARE UPDATE

It is recommended that your system software is kept up to date with the latest released ZeroJet issue. System software can be updated utilising the USB port on the system hub.

1. Turn your system on and ensure it is in standby mode
2. Check the software version installed on your system (see section 10.5.
3. Compare this issue with the latest issue on the ZeroJet website: www.zerojet.com/updates
4. If the software version on the website and that running on your system do not match, download the latest issues from the website.
5. Transfer the downloaded file to a USB memory stick
6. Turn your off (hold system activation button for 3 seconds to transfer to sleep mode)
7. Remove the protective cap from the system hub USB port
8. Plug in the USB memory stick into the system hub
9. Turn the system on
10. The update will take place automatically during boot up
11. The display will inform you when the process is complete
12. Press any button and your system is ready to go



10.10 DISPLAY UPDATE

For software V6.1 or later, the display software may also be updated via the MCM USB port.

1. Turn your system on and ensure it is in standby mode.
2. Compare this issue with the latest issue on the ZeroJet website: www.zerojet.com/updates
3. If the software version on the website and that running on your system do not match, download the latest issues from the website.
4. Transfer the downloaded file to a USB memory stick
5. Remove the protective cap from the system hub USB port
6. Plug in the USB memory stick into the system hub
7. Navigate to the update screen located in the service menu
8. Select the “Display” option to start the update
9. The update will take approximately 7 minutes. During this time the display will be inoperable.
10. The display will inform you when the process is complete
11. Using your system display, navigate to the update menu, located in the service menu (see section 10.1).

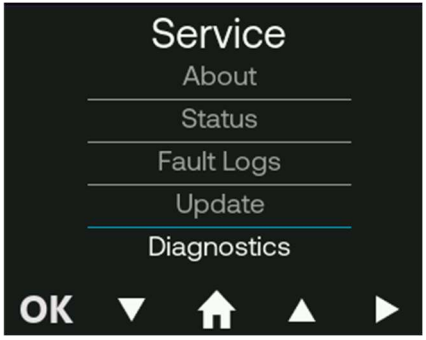
Note: For earlier software versions, the USB in the back of the display is to be used.



10.11 DIAGNOSTICS MENU

As standard the system diagnostics menu is hidden from the user, this is because it is considered part of set up and not part of ordinary use. To access the menu, navigate to the service menu (see section 10.1) and hold the right button for 3 seconds.

This diagnostics option will appear at the bottom of the menu. Selecting the option will give access to throttle calibration and drive health.



11 48V AUXILIARY PORT

Both the 5 and 10kWh ZeroJet battery options are fitted with an auxiliary power output port.

11.1 SPECIFICATION

Maximum Current Draw	5A Maximum
Voltage	48V (Nominal, Unregulated)
Fuse	

11.2 OPERATION

The auxiliary port is live while the system on and in either standby or access

11.3 SYSTEM DESIGN AND FITTING

⚠CAUTION

Auxiliary circuit design and installation should be undertaken by suitably trained and experienced personnel.

For convenance an auxiliary port cable (2 metre cable with the correctly terminated connector) is available as an accessory. For further guidance on auxiliary system design see the ZeroJet Auxiliary Power Output Datasheet.

11.4 FUSE

The output is protected by a user-replaceable fuse located beside the port. The 10A cartridge fuse is accessed with a flat head screw driver for replacement. Ensure the battery box is off and isolated from the system before replacement of the fuse.

⚠CAUTION

The safety and reliability of your battery is reliant on its IP67 ingress protection rating. Watertightness of the low voltage connectors used on your ZJ battery system rely on

- Fitment of specifies connectors
- Correct diameter cable on plugs

NOTICE

When not in use, the auxiliary port is to be fitted with the supplied protective cap.

12 CHARGING

The ZeroJet system is designed to charge with ZeroJet approved charge options only. This constraint prioritises safety while charging your battery pack as quickly and safely as possible, ensuring that every cell in the battery gets fully charged and maintains optimal performance.

NOTICE

This section provides an overview of charging your ZJ20 system. Recommended reading for details on use and maintenance of ZJ20 batteries:

- **ZeroJet 2024 Battery Management (Latest Revision)**
- **For details of charging with your ZeroJet charger, refer to the charger user guide provided with your selected product.**

TIP: The ZJ20 system must be on (display on) to charge!

⚠WARNING

Do not attempt to charge the battery with any charger other than the charger provided by ZeroJet.

NOTICE

While a charger is connected to the system, drive mode is disabled, and the motor cannot be operated.

Your ZeroJet Electric Jet tender incorporates a Lithium Battery pack that uses Lithium Iron Phosphate technology, also known as $LiFePO_4$ or LFP. This type of battery is the safest lithium battery technology available.

Modern $LiFePO_4$ batteries are safe and reliable when used correctly. Correct use means ensuring that the batteries are not charged or discharged beyond the manufacturer's specified limits of current, temperature or voltage.

Within the battery pack is a battery management system (BMS) that continuously checks the state of the battery

and will ensure that the operating limits are not exceeded. To get the best performance and lifespan out of your battery pack refer to recommendations and guidelines in your charger manual.

ZeroJet chargers communicate with the battery management system and adjust the charger output to provide optimal charging.

12.1 CHARGING USING THE ZEROJET SUPPLIED CHARGER

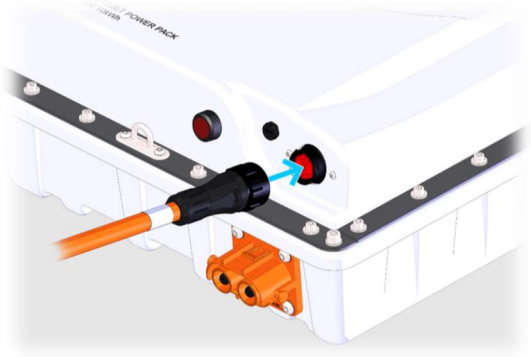
Unlike the Lithium-ion batteries found in consumer devices where fully charging is not recommended, LFP batteries in the ZeroJet system should be charged to 100%. The battery will charge quickly to 99% and then may take some time to complete the charge to 100%. During this period, the cells within the battery are undergoing a cell balancing operation, which optimises performance and battery life. It is acceptable to interrupt the charge before it reaches 100% but avoid repeatedly interrupting the full charge cycle. This stage also calibrates state of charge estimates for accurate display.

12.2 FIRST TIME CHARGING THE BATTERY PACK

The battery pack is shipped in the recommended state-of-charge (SoC) for long term storage. The battery must be fully charged and balanced before first use. This first charge may take longer than normal to fully complete. The display should show SoC at 100%. If the batteries are not charged up to 100% after completing the charging cycle, then another charging cycle should be executed until the batteries reach 100%. To restart the charging process, turn the battery off and on again using the battery on/off switch.

12.3 CHARGE CONNECTOR LOCATIONS

The charge connectors plug on the ZJ20 system may be supplied on the battery pack or in a remote location via an adaptor lead as specified by the boat manufacturer.



Charge Plug Location 10kWh Pack



Charge Plug Location 5kWh Master Pack

⚠CAUTION

Remember to fit the supplied sealing caps to plugs and sockets as you disconnect charge cables as failure to do so may lead to corrosion and system damage.

12.4 CHARGING STEPS

TIP: **The ZJ20 system must be ON to start charging!**

1. Ensure all system connectors are correctly connected.
2. Switch the battery on.
3. Switch the system power isolator switch on.
4. Press the system activation button.
5. Connect the battery:
    a. Remove the sealing caps on the battery, charger outlet and charge cable.
    b. Check for water/contamination in all plugs and sockets.
    c. Connect the charge cable to the charge socket on the battery pack and the charger outlet. Charger plugs are designed to only allow connection in the correct orientation. Do not force the plug into the socket. Once inserted, turn the locking collar clockwise. The locking collar will click into position when fully engaged.



6. Connect the AC power cable to mains power or generator. Charging will start after a few seconds.

TIP: If the boat has not been used for an extended period and the battery has been left on, the battery may be at a very low state of charge. Where this is the case, the battery management system (BMS) may need to be reset to start the charge. Turn the battery off and on again to reset the BMS. BMS reboot takes around 10 seconds. and the charger must be connected within a minute a minute of this**.**

7. When charging starts the contactors (relays) in the battery pack activate with an audible click.

8. Battery charging status can be checked through the following parts of the charging system:
    a. The boat display
    b. ZeroJet charge controller
    c. Cristec charger control panel
9. Charging may be interrupted at any time by:
    - Disconnecting the AC supply to the charger.
    - Switching the system isolator off.
    - Disconnecting the charge cable.

10. When close to full charge the charging current reduces to allow all cells to charge evenly, a process known as balancing. The balance stage typically takes about 10 minutes but can take up to an hour if the pack has not been balanced for some time.
11. The final part of the charge process is called the float stage. At this point charging is complete and the system may be disconnected from the charger. This happens when:
    - The SoC reaches 100% (fully charged) or,
    - When the balancing stage has reached the maximum time allowed.
12. Disconnect the AC suppl the AC supply from the charger, then disconnect the charging cable from both ends (from the charger side and from the battery box side).
13. Remember to fit the sealing caps to plugs and sockets as you disconnect them.
14. Remember to turn the **isolator switch off**.
15. As with all battery systems, the ZJ20 batteries undergo a gradual self-discharge process during storage. To mitigate this, each battery incorporates a latching push-button on/off switch. When engaged, the battery is activated and is ready for use.

Conversely, when disengaged, the battery enters a deep sleep state, ceasing all non-essential operations. This sleep mode ensures safe longer-term storage, while minimising self-discharge rates. While it is optional to switch the battery off after each use during regular usage periods, it is advisable to deactivate it for any storage period exceeding four weeks.

12.5 CHARGING TIMES

Charging times will depend on the output current capacity of the charger and the depth of discharge. The following table provides some charge time estimates using our standard rate AC charger with 110 and 230V_{AC} power, and battery temperature are between 10-45°C (50-113°F).

5kWh and (10kWh) battery standard charger [estimated duration]

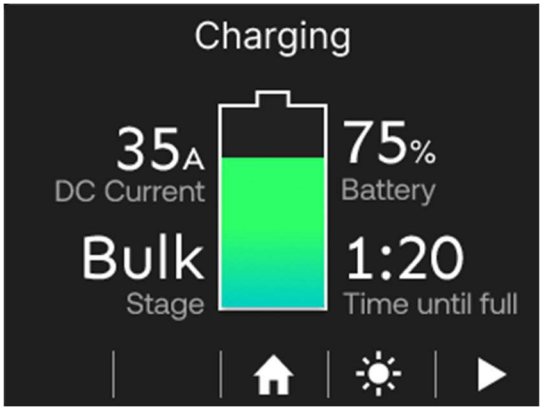
	230V_{AC} 40A	**120V_{AC} 32A**
0-99%	2.5hr/(5hr)	3hr/(6hr)
20-99%	2hr/(4hr)	2.5hr/(5hr)
+ Balancing	30min typ.	30min typ.

Note:

Charge times given are based on a standard rate ZeroJet charger. Use of a ZeroJet fast charger will approximately halve charge times.

12.6 STATE OF CHARGE

The boat display will show the charging times and the SoC of the battery.



12.7 PERIODS BETWEEN USE

If the boat will not be used for a long period (more than four weeks) the battery should be switched off using the switch provided on the pack (the position of this switch may be extended to a more convenient location by the boat manufacturer, refer to vessel user guide). This will avoid unwanted slow discharge of the batteries[i].

12.8 BMS RESET

Battery charging and balancing is managed by a battery Management System or BMS integral to the battery packs.

In the event of a fault, the BMS may need to be reset to resume operation. Reset the batteries by turning them off and on with the button provided.

12.9 TIPS - MAXIMISING THE BATTERY LIFETIME

Refer to ZeroJet 2024 Battery Management for guidance on maximising the life span of your batteries.

⚠CAUTION

Do not charge the battery pack while the boat is in the water. Wake from passing vessels can cause stress and damage to the battery pack, connectors, and cables while the power plug is connected.

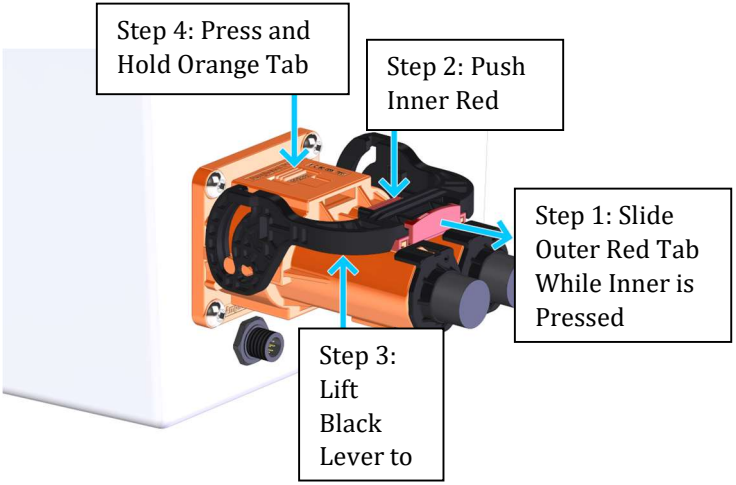
NOTICE

Disconnect the charger from the mains and the battery pack once the batteries are fully charged.

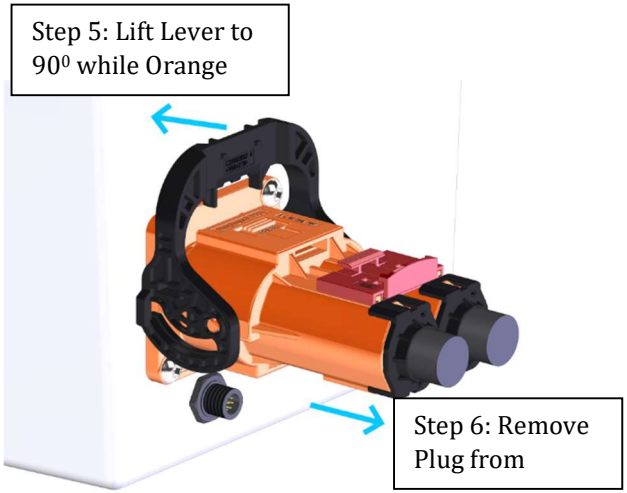
⚠CAUTION

When unplugged the weather-tightness of your battery box is reduced and connectors are less protected from corrosion. Storage of unconnected batteries should be in an environment protected from the weather.

12.10 DISCONNECTING HIGH CURRENT CONNECTORS



1. A small red locking tab secures the black lever in the closed position. Slide the red locking tab away from the black lever.
2. Press the inner red tab and the lever will be released.
3. Raise the black lever to approximately 45°.



4. Press the square tab on the top of the connector with one hand.
5. Continue to raise the lever to the 90° position with the other hand.
6. The connector is now disconnected and can be moved clear of the battery pack.
7. Ensure the sealing plug is clean and dry and fit it to the open end of the connector and then close the black lever.

12.11 CONNECTING HIGH CURRENT CONNECTORS

1. Raise the black lever to the 90° position and remove the sealing plug from the end of the connector.
2. Inspect the connector and receptacle for damage or debris and wipe clean if necessary.
3. Identify the correct orientation for the connector and align the connector carefully with the receptacle.
4. Ensure the black lever is fully open in the 90° position and slide the plug into the receptacle.
5. Close the black lever against the body of the plug which will draw the plug into the receptacle.
6. Slide the red locking tab to secure the black lever in the closed position.



12.12 CLEANING/LUBRICATING CONNECTORS

Always take care when handling the system connectors. Do not force latches or locking collars and ensure connectors are properly aligned during insertion. Visually check both sides of the connector for contamination and proper orientation before attempting to mate them.

Always fit the supplied sealing caps to connectors. Check the sealing cap is clean and dry before fitting.

If a connector has become contaminated with seawater, the cable should be immediately disconnected from all sources of power. Unplug both ends of the cable or disconnect the batteries from the system. The seawater should be carefully rinsed off with fresh water and the connector allowed to dry thoroughly before use.

Do not spray connectors with any substance containing solvents or mineral oils, even if marked as safe for use on plastics. This includes CRC 5.56, WD40, electrical contact cleaner, etc. These products will result in damage to the seals. A silicone-based dielectric grease may be

applied to connectors to lubricate seals and help repel water.

12.13 BATTERY STORAGE

Refer to ZeroJet 2024 Battery Management for guidance on battery storage (periods over four weeks).

12.14 SACRIFICIAL ANODES

Like most marine equipment, the ZeroJet system uses sacrificial anodes to protect the submerged or semi submerged components from the effects of galvanic corrosion. These sacrificial parts wear over time, and the rate of wear depends on factors such as water salinity, temperature as well as the presence of other minerals or contaminants in the water in which the unit operates. The anodes supplied are 23mm in diameter and 34g in mass when new. As a general rule, these should be replaced when the mass drops to around half (17g), which approximates to a diameter of around 17mm. As conditions vary, the nature of visible wear will also vary. The image below shows new (left) and worn anodes for reference.

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12.15 MAINTENANCE INSPECTIONS

To keep your ZeroJet system at its best operating condition it is important to conduct the following inspections before and after use.

Regular service period	Check and maintenance
Before each use	Check battery state of charge.
	Inspect hull for standing water.
	Check emergency tether operation.
After each use	Wash down external parts with fresh water.
	Leave system housing open to allow condensation to dry.
Periodically	Inspect sacrificial anodes and replace as required.

For replacement parts, installation, and service advice, contact ZeroJet.

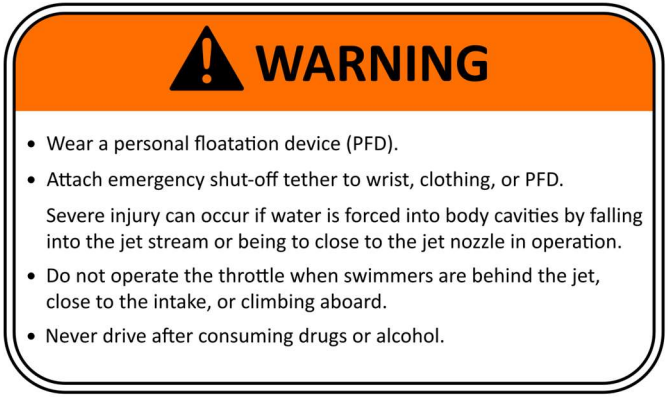
13 TROUBLESHOOTING

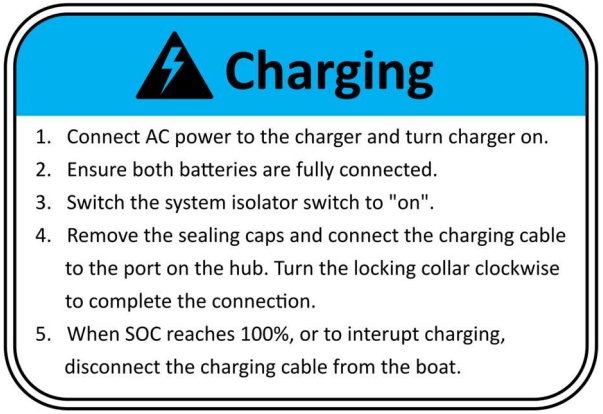
Problem	Cause	Check/Correction
System will not start in accessory mode (Screen is blank)	The battery is in sleep state	Check the battery on/off switch is in the on position.
	Isolation switch not closed	Check and ensure battery isolator switch is turned to the 'on' position.
	Poor battery connection	Disconnect all battery connections. Inspect plugs for water ingress or damaged/bent pins. Reconnect all plugs.
	BMS requires reset	Perform a hard reset by turning the battery off and on again. The battery will take approximately 10 seconds to reboot when switched back on. Contact ZeroJet for assistance resolving any battery management issues.
System will not enter drive mode	Throttle not in neutral	Check throttle is moving freely, if not contact ZeroJet for replacement. For console systems, check the throttle is in the neutral position. With tiller systems, check throttle is moving freely, if not contact ZeroJet for replacement.

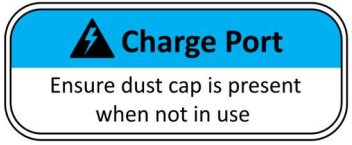
	Safety lanyard not attached	The system will not enter drive mode unless the safety lanyard is attached (aft of throttle/ tiller)
Limited power, or system cuts out while in use	Low battery	Check battery state on display. System will go into reduced power at 15%. Charge battery if charge reads below 15%.
Poor Performance & rough sound coming from jet	Clogged jet intake	See 9.7 for clearing an intake blockage.
	Worn or damaged impeller or impeller wear ring	For replacement parts, installation, and service advice, contact ZeroJet.
Intermittent, violent pump sounds when operating at speed	Aeration in pump	Air can travel under the hull through the pump, particularly when operating at speed on rough water. Rearrange weight to trim the bow down and reduce speed.
	Coolant system leak	Check the system for coolant pooling in the base. Check all connections are firmly made.

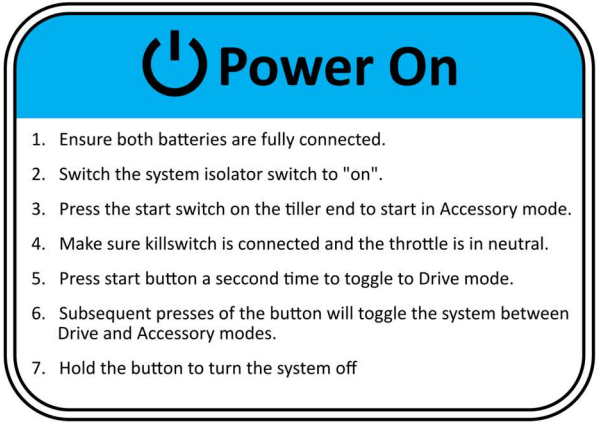
Poor cooling system performance, no cooling pump noises or noisy cooling pump	Broken or faulty coolant pump	Coolant pump should start when the system is in drive mode. Contact ZeroJet for replacement parts if pump does not start.
Batteries will not charge	Battery isolation switch is off	Check and ensure battery isolation switch is switched.
	Battery on/ off switch is off	Check the red on/off button is set to the on position
	No power to charger	Check charger connected, is switched on and is receiving main/generator power for charging.
	Poor battery connections	Disconnect all battery connections. Inspect plugs for water ingress or damaged and bent pins.
	BMS requires reset	Turn the battery off, wait 10 seconds, then turn on again.
	Damaged battery pack	Contact ZeroJet for assistance. Do not attempt to service this yourself.

14 WARNING LABELS









15 CABLE LAYOUT

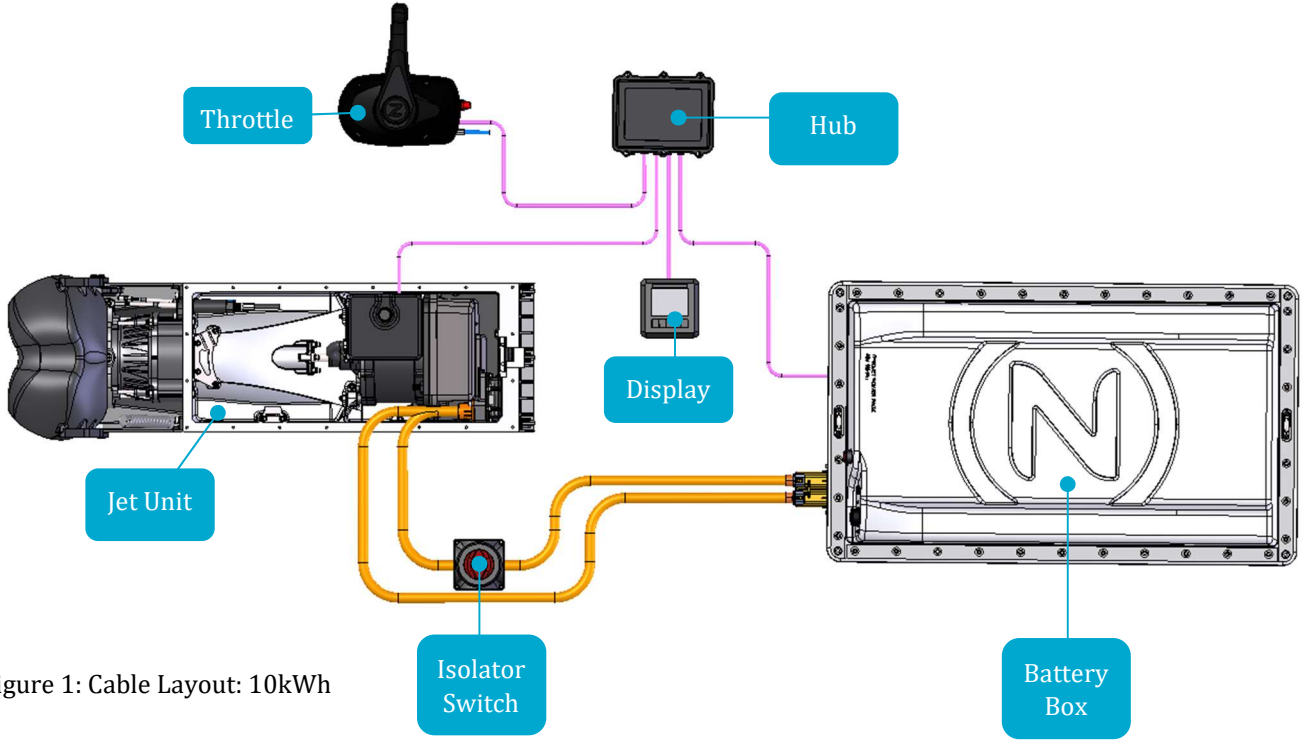


Figure 1: Cable Layout: 10kWh

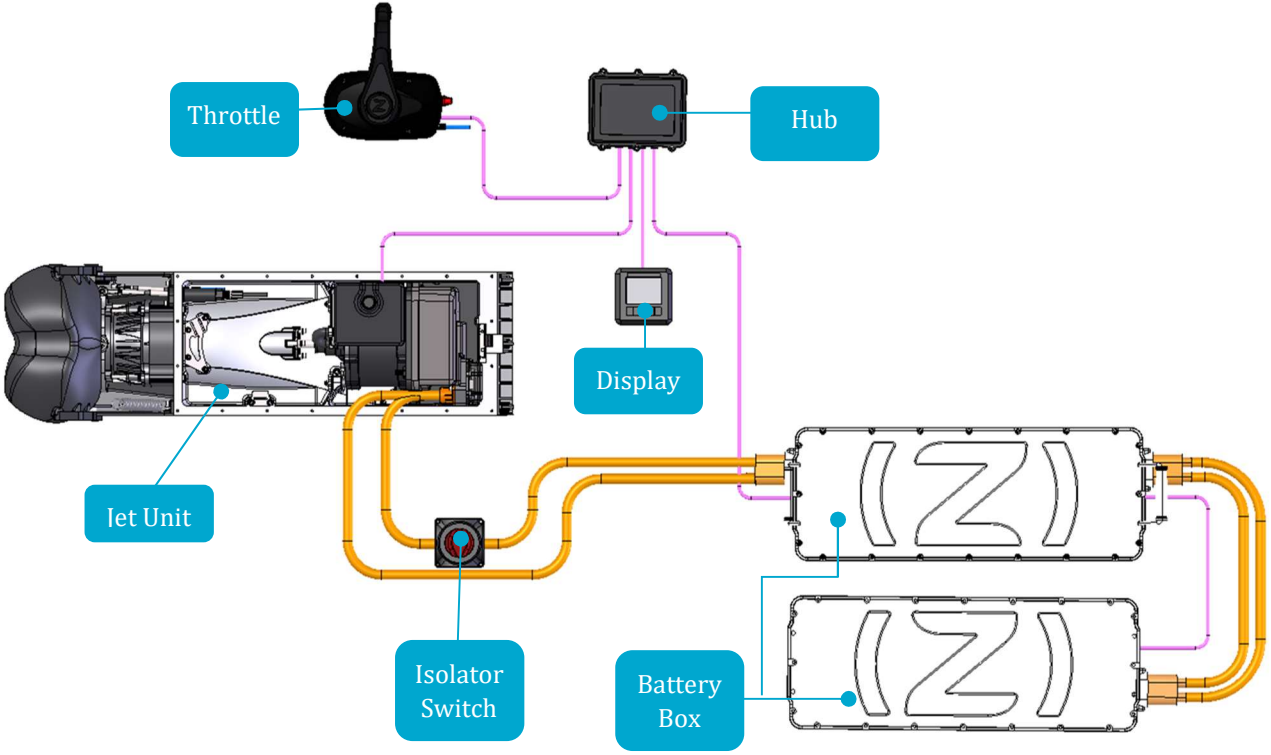


Figure 2: Cable Layout: 5kWh

ZEROJET

ELECTRIC JET SYSTEMS