BINDING HOLE AREA
10 mm — DO NOT PLACE IMPORTANT CONTENT
10 mm

NZWAR
NEW ZEALAND DEFENCE, SECURITY & RESILIENCE

PREPARE
ADAPT
SURVIVE

SALVAGE POWER

A PRACTICAL HANDBOOK FOR BUILDING RELIABLE POWER FROM SECOND-HAND EQUIPMENT IN WAR, DISASTER AND OFF-GRID CONDITIONS



FIND
SECOND-HAND EQUIPMENT



SALVAGE
USABLE PARTS



BUILD
RELIABLE POWER



POWER
DAILY LIFE IN TOUGH CONDITIONS

FIND SOURCES | **SALVAGE** USABLE PARTS | **GENERATE** POWER | **IDENTIFY** SYSTEMS | **CONTROL** AND MONITOR | **PROTECT** EQUIPMENT | **CHARGE** DEVICES | **STORE** ENERGY | **TEST** BEFORE USE | **USE** IN DAILY LIFE

10 mm

BINDING HOLE AREA
10 mm — DO NOT PLACE IMPORTANT CONTENT

SALVAGE POWER

EMERGENCY USE / DISCLAIMER / SCOPE

AMBER
MEDIUM RISK
READ AND UNDERSTAND
BEFORE PROCEEDING

WHAT THIS HANDBOOK IS FOR

Practical guidance for using salvaged and second-hand equipment to build **basic, low-power off-grid electricity for survival** in war, infrastructure collapse, prolonged outage, evacuation or genuine wilderness conditions.

WHAT THIS HANDBOOK IS NOT FOR

Not for normal household use, commercial electrical work, paid work, product manufacture or certification. Not a guide to modify fixed building wiring. **Not for powering household appliances** such as air conditioners, refrigerators, TVs or computers.

WHEN NORMAL OPTIONS EXIST

In peacetime, or when safe and compliant equipment and professional services are reasonably available, **buy and use proper equipment**. Salvage power is a survival fallback – not a cheaper substitute for normal equipment.

KEY LIMITS AND RISKS

Salvaged and improvised systems can be dangerous, unreliable and may cause fire, injury or death. Follow local law, manufacturer instructions and professional advice. If the source, voltage or equipment condition cannot be safely established, **stop.**

DO NOT CONNECT HOUSEHOLD APPLIANCES OR BUILDING WIRING TO AN IMPROVISED SALVAGE POWER SYSTEM.

THE GOAL IS NOT COMFORT.
THE GOAL IS ENOUGH POWER TO COMMUNICATE, SEE AND SURVIVE.

P SAFETY FOUNDATION

P00	COVER — SALVAGE POWER
P01	EMERGENCY USE / DISCLAIMER / SCOPE
P02	HOW TO USE THIS HANDBOOK
P03	ELECTRICITY CAN KILL
P04	STOP → ISOLATE → VERIFY → WORK DEAD
P05	MINIMUM FIELD ELECTRICAL KIT
P06	MULTIMETER — KNOWN LOW-VOLTAGE DC ONLY
P07	EMERGENCY FIELD PROTECTION — HANDS & BODY
P08	EMERGENCY FIELD PROTECTION — WORK AREA & BARRIERS
P09	DON'T BECOME THE SECOND VICTIM / RESCUE PARTNER
P10	SAFE WORK AREA & ESCAPE ROUTE
P11	UNKNOWN SOURCE — ONE RULE DECIDES
P12	LOW VOLTAGE DOES NOT MEAN NO DANGER
P13	230V / BUILDING WIRING / INDUSTRIAL CABINETS — RED
P14	BEFORE YOU SALVAGE: FINAL GO / NO-GO

A SAFE SALVAGE

A01	SAFE SEARCH — ENVIRONMENT FIRST
A02	LABEL & PROVENANCE — WHAT IS WORTH TAKING
A03	VISUAL REJECT LIST
A04	PHOTOGRAPH & LABEL BEFORE REMOVAL
A05	DE-ENERGISED REMOVAL
A06	SALVAGE CABLES, TERMINALS & FUSE BOXES
A07	COMPLETE MODULES BEFORE BARE BOARDS
A08	WET / FLOODED EQUIPMENT — DO NOT POWER IT TO TEST

B VEHICLE & COMPLETE STORED ENERGY

B01	CONVENTIONAL 12V VEHICLES — WHAT MAY BE USED
B02	HYBRID / MHEV / EV / 48V — STOP
B03	VEHICLE SRS — DO NOT TOUCH
B04	TAKE 12V FROM THE ORIGINAL ACCESSORY OUTLET FIRST
B05	12V BATTERY — SHORT-CIRCUIT PROTECTION
B06	OTHER COMPLETE STORAGE — POWER BANK / TOOL BATTERY

C SALVAGED MOTORS AS GENERATORS

C01	WHICH MOTORS MAY GENERATE
C02	MECHANICAL SAFETY BEFORE MOTOR REMOVAL
C03	KEEP SHAFTS, PULLEYS, BRACKETS & PLUGS
C04	2 WIRES / 3 WIRES ARE ONLY CLUES
C05	VISIBLE BRUSHES / COMMUTATOR — PMDC CLUE
C06	BLDC / STEPPER — RECTIFICATION / MATCHING MAY BE NEEDED
C07	HAND-TURN TEST — NO SHORTING, NO BODY TEST
C08	UNKNOWN MOTOR = STOP

D HUMAN / BICYCLE POWER

D01	BICYCLE GENERATION — STABILISE THE FRAME FIRST
D02	GEARING — SMOOTH MECHANICS, NOT MAGIC NUMBERS
D03	HUMAN POWER — SUSTAINABLE EFFORT FIRST
D04	HUMAN POWER ENTERS THE SAFE CHARGING CHAIN

E MICRO-HYDRO

E01	CHOOSE THE WATER SITE — ESCAPE & FLOOD FIRST
E02	NO-METER WATER ASSESSMENT — CONTINUITY, NOT WATTS
E03	SEPARATE WATER WHEEL & GENERATOR
E04	MECHANICAL OBSERVATION BEFORE LOAD
E05	TEST WITH A KNOWN SMALL LOAD
E06	RISING / DIRTY WATER OR MOVING SUPPORT = LEAVE

F WIND POWER

F01	WIND SITE — MARK THE FALL / ROTOR DANGER ZONE
F02	TOWER / GUYS / ANCHORS — MECHANICS FIRST
F03	BLADES & HUB — CRACKED MEANS DISCARD
F04	WIND OUTPUT ENTERS A MATCHED CONTROL CHAIN
F05	SHUT DOWN BEFORE WEATHER DETERIORATES
F06	RUNAWAY / LOSS OF CONTROL — STAND CLEAR

G IDENTIFY, CONDITION & TEST

G01	AC OR DC — IF YOU DON'T KNOW, DON'T CONNECT
G02	RECTIFY ONLY WHEN REQUIRED
G03	REGULATION IS NOT A BATTERY CHARGER
G04	FUSES PROTECT CONDUCTORS & FAULTS
G05	LOW-VOLTAGE MULTIMETER TEST FLOW
G06	CONTROLLED POWER-ON TEST
G07	INCANDESCENT / KNOWN LOAD — AUXILIARY CLUE ONLY
G08	NO METER — WHAT YOU CAN & CANNOT KNOW

CH GENERATION TO SAFE CHARGING

CH01	GENERATOR ≠ BATTERY CHARGER
CH02	IDENTIFY GENERATOR OUTPUT
CH03	RECTIFY ONLY IF REQUIRED
CH04	CHOOSE A MATCHED COMMERCIAL CHARGE CONTROLLER
CH05	CONNECT EVERYTHING DE-ENERGISED
CH06	CHARGE 12V LEAD-ACID BY BATTERY/OEM PROFILE
CH07	CHARGE COMPLETE LITHIUM PRODUCTS
CH08	MONITOR, SHUT DOWN & DISCONNECT

I BATTERIES / STORAGE

I01	BATTERY FIRST LOOK — DAMAGE = REJECT
I02	LEAD-ACID TYPES & LABELS
I03	LEAD-ACID — NO MATCHED CONTROLLER, NO BLIND CHARGE
I04	USED LEAD-ACID — REJECT SCREEN ONLY
I05	DO NOT RANDOMLY SERIES/PARALLEL USED BATTERIES
I06	LITHIUM — COMPLETE ORIGINAL PACKS ONLY
I07	LITHIUM — NO BMS BYPASS / FORCE CHARGE
I08	DAMAGED LITHIUM — DISTANCE FIRST
I09	COLD / WET BATTERIES — FOLLOW OEM LIMITS
I10	BATTERY TEMPERATURE — ABNORMAL TREND = STOP

J LOADS & USB

J01	LOAD PRIORITY — COMMS → NAVIGATION → LIGHT
J02	USB — PREFER COMPLETE COMMERCIAL CAR/POWER MODULES
J03	USB-C / PD — NO DIY PROTOCOL WIRING
J04	PHONE CHARGING — VERIFY THE SOURCE FIRST
J05	12V LIGHTING — LOW CONSUMPTION FIRST
J06	RADIO / COMMS — SAVE POWER BY MISSION

K INVERTERS, SYSTEM INTEGRATION & PACK-DO

K01	INVERTER — OUTDOOR / DRY / STANDALONE / DIRECT LOAD ONLY
K02	NEVER CONNECT AN INVERTER TO BUILDING WIRING
K03	INVERTER EARTHING / RCD — MANUFACTURER DESIGN ONLY
K04	SYSTEM ASSEMBLY — CHECK SOURCE TO LOAD, ONE STAGE AT A TIME
K05	TROUBLESHOOT — CHANGE ONE VARIABLE AT A TIME
K06	FINAL PACK-DOWN — ISOLATE SAFELY

P03 ELECTRICITY CAN KILL

UNDERSTAND THE DANGERS BEFORE YOU TOUCH ANY ELECTRICAL EQUIPMENT.

GREEN
SAFETY AWARENESS FOR EVERYONE



ELECTRICITY INJURES AND KILLS

Electric shock, fire, burns, battery explosions and moving machinery can cause serious injury or death.

Do not underestimate low voltage systems.

In an emergency or off-grid situation, you may need to work with salvaged and makeshift equipment. Understand the risks and take every possible precaution.

ELECTRIC SHOCK



- Can cause muscle spasm (you may not be able to let go).
- Can stop breathing.
- Can cause heart arrest.
- Can kill even at low voltages in certain conditions (wet, high current, through the chest).

FIRE & BURNS



- Short circuits can cause fire.
- Damaged cables can overheat.
- Battery or fuel fires can spread quickly.
- Can cause severe burns and smoke inhalation.

BATTERY HAZARDS



- Can deliver very high current (short circuit).
- Can explode if damaged, overcharged or near flames.
- Can leak corrosive acid.
- Can cause eye injuries, burns and fires.

MOVING PARTS



- Rotating parts (belts, chains, fans, shafts) can pull in clothing or fingers.
- Can cause severe cuts, fractures or death.
- Always keep hands, hair, clothing and tools clear.

ENVIRONMENTAL RISKS



- Water and damp conditions increase the risk of electric shock.
- Mud, rain and sweat reduce body resistance.
- Keep electrical parts dry and off the ground where possible.

COMMON AND DEADLY MISTAKES



Touching to "check" if it has power.



Working with wet hands or in rain.



Using damaged or exposed wires.



Using metal tools near live circuits.



Wearing rings, watches or jewellery.

KEY MESSAGES

- Electricity can kill — take it seriously.
- Low voltage does not mean no danger.
- Do not use your body to test for power.
- Inspect, identify and isolate before touching.
- Use proper protection and safe working methods.
- When in doubt, STOP.

NEXT STEP

P04 STOP → ISOLATE → VERIFY → WORK DEAD

Follow the safe steps before you touch any electrical equipment.

P04 STOP → ISOLATE → VERIFY → WORK DEAD

FOLLOW THESE SAFE STEPS BEFORE YOU TOUCH ANY ELECTRICAL EQUIPMENT.

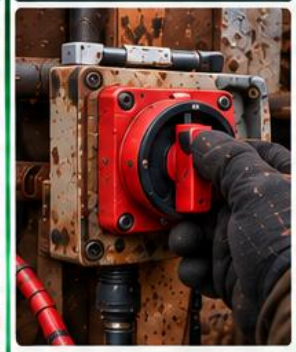
GREEN
SAFETY PROCEDURE FOR EVERYONE

1 STOP
THINK AND ASSESS



- Stop and think.
- Identify what it is and where it comes from.
- Look for damage, water, fire risk or other hazards.
- If you are not sure, do not touch it.

2 ISOLATE
REMOVE ALL SOURCES



- Turn off and disconnect all power sources (batteries, generators, solar, chargers, etc).
- Remove plugs, fuses or disconnect cables.
- Make sure it cannot accidentally be turned on or reconnected.

3 VERIFY
CHECK IT IS DEAD



- Use a suitable meter to check for voltage.
- Test between all likely terminals (including positive/negative and to ground).
- Confirm 0V (or as close to zero as possible).
- Do not rely on switches or appearance alone.

4 SECOND CHECK
CHECK AGAIN



- Check again after a short time.
- Check all relevant points, not just one.
- If in doubt, assume it is still live.
- If you cannot safely verify, STOP.

5 DISCHARGE
RELEASE STORED ENERGY



- Allow time for stored energy to discharge (capacitors, inverters, controllers, etc).
- Use an appropriate resistor/approved method if required.
- Do not short with a screwdriver.
- Follow manufacturer guidance if available.

6 SECURE
PREVENT RE-ENERGISATION



- Keep the disconnection secure.
- Use a physical lock, tag or clear warning sign if possible.
- Keep keys with you.
- Ensure others know it is isolated and must not be turned on.

7 WORK DEAD
ONLY THEN START



- Only start work when you are sure it is dead.
- Keep the area dry, clean and well lit.
- Use proper protection and safe working methods.
- If anything changes, STOP and go back to Step 1.

NEVER SKIP THESE STEPS



Do not rely on appearance — it may still be live.



Do not work with wet equipment or in rain.



Do not assume low voltage is safe to touch.



Do not short with a screwdriver.

KEY MESSAGES

- **Always STOP → ISOLATE → VERIFY → WORK DEAD.**
- Electricity can kill — take it seriously.
- Low voltage does not mean no danger.
- Use a suitable meter and proper method.
- Prevent accidental re-connection.
- When in doubt, STOP.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

P05 MINIMUM FIELD ELECTRICAL KIT

BE PREPARED. THE RIGHT TOOLS HELP YOU STAY SAFE.

GREEN
SAFETY AWARENESS FOR EVERYONE



THE RIGHT TOOLS REDUCE RISK

A small, basic electrical kit helps you check, isolate and work more safely in off-grid and emergency situations.

Use tools that are in good condition, rated for the job and suitable for low voltage DC systems.

Do not rely on makeshift or damaged tools.

DIGITAL MULTIMETER (DMM)



- Check voltage (DC only and only if you know the source).
- Test continuity.
- Check for short circuits.
- Keep in good condition with good leads.

NON-CONTACT VOLTAGE TESTER



- Quickly check if a wire or equipment may be live.
- Useful for unknown sources (AC).
- Does not replace a DMM.
- Always follow the manufacturer's guide.

EYE PROTECTION



- Protects against sparks, flying debris and acid splashes.
- Wear when working on batteries or damaged equipment.
- Keep clean and scratch free.

INSULATED GLOVES



- Help reduce risk when handling electrical parts.
- Use gloves suitable for electrical work.
- Check for damage before each use.
- Keep them clean and dry.

INSULATED HAND TOOLS



- Use insulated screwdrivers, pliers and cable cutters.
- Keep tools in good condition.
- Use the right tool for the job.
- Do not use damaged tools.

ESSENTIAL EXTRAS



- Electrical tape (insulation and temporary repairs).
- Headlamp or torch (hands free).
- Markers or labels (to identify cables).
- Keep everything together in a sturdy bag.

COMMON MISTAKES



Using damaged or frayed leads.



Using tools with rust or corrosion.



Using non-insulated tools.



Not keeping tools together (lost or damaged).

KEY MESSAGES

- Carry a minimum electrical kit.
- Use tools in good condition and rated for the job.
- Only work on **low voltage** DC if you know the source.
- Use PPE (gloves and eye protection).
- Keep tools together, clean and dry.
- If in doubt, **STOP** and get advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

P06 MULTIMETER — KNOWN LOW-VOLTAGE DC ONLY

CONFIRM POLARITY AND APPROXIMATE VOLTAGE ONLY ON KNOWN LOW-VOLTAGE DC SOURCES.

AMBER
USE WITH CAUTION
BASIC KNOWLEDGE REQUIRED



USE ONLY ON KNOWN LOW-VOLTAGE DC

- A multimeter helps you confirm approximate voltage and polarity on known low-voltage DC sources (such as 12 V or 24 V batteries).
- Do not use a multimeter on unknown sources.
- Do not use it on AC mains (e.g. 230 V).
- Do not assume a system is low voltage.
- If you are unsure, STOP and get advice.

CHECK DC VOLTAGE



- Set the meter to DC voltage (V⎓).
- Connect the red probe to positive (+) and black probe to negative (–).
- Read the approximate voltage.
- Compare with expected value (e.g. ~12 V or ~24 V).

CONFIRM POLARITY



- Red probe to positive (+).
- Black probe to negative (–).
- Confirm polarity matches your system.
- If the reading is negative (e.g. -12.6 V), the probes are reversed.

CHECK CONTINUITY



- Use continuity mode (•))/Ω).
- Check for shorts or broken connections.
- A beep means a connection (very low resistance).
- No beep means open circuit.
- Always test with power OFF when checking continuity.

CHECK FUSE



- You can test a fuse with continuity mode.
- A good fuse will beep (low resistance).
- A blown fuse will show open circuit (no beep).
- Replace only with the correct rating.

CHECK CABLES



- Check for damage, corrosion or loose connections.
- Wiggle the cable while testing if needed.
- Make sure insulation is intact.
- Do not use cables with exposed wires.

COMMON AND DANGEROUS MISTAKES



Never use on AC mains (e.g. 230 V).



Do not use damaged probes or insulation.



Do not use on unknown sources.



Do not use in wet conditions or with wet hands.

KEY MESSAGES

- Use a multimeter only on known low-voltage DC sources.
- Confirm approximate voltage and polarity.
- Use the correct setting (DC V, Ω, continuity).
- Check tools, probes and leads are in good condition.
- Do not use on unknown sources or AC mains.
- Keep hands dry and work in a safe area.
- If in doubt, STOP and get advice.

P07 EMERGENCY FIELD PROTECTION

PROTECT YOUR HANDS, EYES, BODY AND FEET WHEN WORKING AROUND ELECTRICAL EQUIPMENT.

GREEN
SAFETY PROCEDURE FOR EVERYONE



PROTECT YOURSELF FIRST

Using the right personal protective equipment (PPE) reduces the risk of electric shock, sparks, flying debris, chemicals, cuts and other injuries.

In an emergency or off-grid situation, you may need to work with salvaged equipment. Basic protection can prevent serious injury or death.

Use appropriate PPE and keep it in good condition.

EYE PROTECTION



- Wear safety glasses or goggles.
- Protects against sparks, flying debris, dust and splashes.
- Keep lenses clean and scratch free.
- Use wrap-around style for better protection.

HAND PROTECTION



- Use insulated work gloves for electrical work (low voltage).
- Check gloves for damage before each use.
- Keep gloves clean and dry.
- Do not use gloves with holes, cracks or missing insulation.

CLOTHING & FOOTWEAR



- Wear long sleeves and long pants.
- Use sturdy, closed shoes with good grip.
- Avoid loose clothing, hoodies and dangling items.
- Keep clothing dry and away from moving parts.

HEAD PROTECTION



- Wear a hard hat where there is risk of falling objects.
- Protects your head from impact and debris.
- Useful in unstable or damaged environments.
- Check for cracks or damage before use.

HEARING PROTECTION



- Use hearing protection in noisy environments.
- Helps prevent long term hearing damage.
- Useful when working with generators, power tools or heavy machinery.
- Keep ear muffs clean and in good condition.

COMMON AND DANGEROUS MISTAKES



No eye protection (risk of serious eye injury).



Using damaged gloves.



Open shoes or sandals (no protection).



Short sleeves (exposed skin).



Loose clothing (can get caught).

KEY MESSAGES

- Use appropriate PPE for the job and environment.
- Keep PPE in good condition and check before each use.
- Wear eye, hand, body, head and hearing protection as needed.
- Avoid loose clothing and open shoes.
- PPE reduces risk but does not remove all danger.
- If in doubt, STOP and get advice.

P08 EMERGENCY FIELD PROTECTION

WORK AREA & BARRIERS — REDUCE THE RISK FOR EVERYONE.

GREEN
SAFETY PROCEDURE FOR EVERYONE



KEEP A SAFE WORK AREA

A cluttered, wet or poorly organised work area increases the risk of electric shock, trips, falls and other injuries.

Set up a clear, stable and well-lit work area before you start.

Use simple barriers and signage to keep bystanders, especially children, away.

Keep escape routes clear so you can leave quickly if needed.

Maintain a dry and stable footing as much as possible.

SET UP BARRIERS



- Use cones, tape or improvised barriers to mark the work area.
- Keep bystanders and children out of the area.
- Use clear warning signs if available (e.g. “DANGER” or “KEEP OUT”).
- Make the work area large enough for safe movement.

GOOD LIGHTING



- Use a headlamp or work light to make sure you can see clearly.
- Good lighting helps you spot hazards, damage and wet conditions.
- Keep lighting stable and protected from water.
- Avoid working in poor light unless necessary.

KEEP DRY



- Avoid working in rain, standing water or very wet conditions.
- Use dry mats, boards or tarps if possible.
- Keep tools, cables and electrical parts dry.
- Water, mud and sweat increase the risk of electric shock.

STABLE WORK AREA



- Use a stable, non-slip surface for tools and equipment.
- Keep the work area tidy and organised.
- Prevent tools from falling.
- Make sure there is enough space to move safely.
- Use boxes or crates to keep tools off the ground.

CLEAR ESCAPE ROUTE



- Always keep at least one clear escape route.
- Do not block exits with tools, cables or equipment.
- Make sure you can move away quickly if something goes wrong.
- Keep the route wide, stable and well lit.

COMMON MISTAKES

THESE INCREASE THE RISK OF INJURY OR DEATH.



Cluttered work area (trip and fall hazard).



Working in wet or muddy conditions.



No barriers (bystanders enter).



Poor lighting (cannot see hazards).



Blocked escape route (cannot leave quickly).

KEY MESSAGES

- Set up a clear and organised work area.
- Keep bystanders, especially children, out.
- Use good lighting and keep the area dry.
- Use barriers, signs and stable surfaces.
- Keep tools and cables tidy and off the ground.
- Always keep at least one clear escape route.
- If conditions are not safe, STOP and make the area safe first.

P09 DON'T BECOME THE SECOND VICTIM

IF ANOTHER CAPABLE PERSON IS AVAILABLE — ONE OPERATES, ONE OBSERVES.

GREEN
SAFETY PROCEDURE FOR EVERYONE



WORK AS A TEAM

If another capable person is available, do not work alone.

One person operates, the other observes from a safe position.

A rescuer who is also injured cannot help.

Good communication, clear roles and a rescue plan can save lives.

ONE OPERATES



- Focus on the task.
- Use the correct tools and PPE.
- Follow safe procedures (step by step).
- Keep aware of your limits.

ONE OBSERVES



- Stay in a safe position (outside the hazard zone).
- Watch for danger, smoke, sparks, movement or changes.
- Check for other risks (e.g. unstable structure).
- Be ready to call for help.

COMMUNICATE



- Agree on clear hand signals or simple communication.
- Confirm each step before doing it.
- Speak up immediately if something looks wrong.
- Do not rush.

BE READY TO HELP



- Know how to stop work and isolate the source.
- Be familiar with basic first aid and CPR.
- Keep a first aid kit and communication device ready (radio/phone/satellite).
- Call for help if needed.

AVOID DIRECT CONTACT



- The observer does not touch the equipment.
- Stay well clear of live parts, moving machinery or unstable structures.
- Keep bystanders, especially children, away.
- Be ready to assist only when it is safe.

COMMON MISTAKES



Working alone (no observer).



Rescuer also injured (cannot help).



Bystanders too close (e.g, children).



No communication or unclear roles.

KEY MESSAGES

- Try not to work alone.
- One operates, one observes.
- Keep a safe distance.
- Communicate clearly and agree on roles.
- Be ready to call for help and give first aid.
- If in doubt, STOP and reassess.

P10 SAFE WORK AREA & ESCAPE ROUTE

KEEP BYSTANDERS AWAY, PLAN YOUR MOVEMENT AND A CLEAR EXIT AT ALL TIMES.

GREEN
SAFETY PROCEDURE FOR EVERYONE



PLAN A SAFE WORK AREA

A safe and organised work area reduces the risk of electric shock, trips, falls and other serious injuries.

Keep bystanders, especially children, out of the area.

Make sure you have a clear and safe escape route before you start.

Keep the area well lit, stable, dry and free from unnecessary clutter.

If the situation changes, STOP and reassess.

KEEP BYSTANDERS AWAY



- Keep bystanders, especially children, out of the work area.
- Use cones, tape or clear signs.
- Make the work area large enough for safe movement.
- Do not allow non-essential people to enter.

PLAN ESCAPE ROUTE



- Identify and keep a clear escape route at all times.
- Ensure the route is free from tools, cables and equipment.
- Keep the route wide, stable and well lit.
- Know where to move if something goes wrong.

GOOD LIGHTING



- Use natural light when possible.
- Use headlamps or work lights in low light conditions.
- Make sure you can clearly see your work area, tools, cables and surroundings.
- Avoid working in poor light unless it is necessary.

STABLE WORK AREA



- Use a stable, non-slip surface for tools and equipment.
- Keep the work area tidy and organised.
- Prevent tools from falling or being knocked over.
- Avoid loose debris, uneven ground and unstable structures.

WATCH FOR HAZARDS



- Look for holes, uneven ground, loose objects and slippery areas.
- Keep cables, hoses and tools out of walking paths.
- Watch for moving machinery, falling debris and other people.
- Minimise clutter and trip hazards.

COMMON MISTAKES



Allowing children or bystanders too close.



Blocked or unclear escape route.



Poor lighting (cannot see hazards).



Cluttered work area (trip hazard).



Working in very wet or unstable conditions.

KEY MESSAGES

- Keep bystanders, especially children, away.
- Plan and maintain a clear escape route.
- Use good lighting and keep the area well lit.
- Keep the work area stable, tidy and free from unnecessary clutter.
- Watch for trip hazards, uneven ground and changing conditions.
- If the situation changes or it is not safe, STOP and move to safety.

P11 UNKNOWN SOURCE – ONE RULE DECIDES

IF YOU DO NOT KNOW THE SOURCE OR VOLTAGE, YOU DO NOT TOUCH. STOP.

GREEN
SAFETY PROCEDURE FOR EVERYONE



UNKNOWN CAN BE DEADLY

If you do not know the source, voltage or whether it is AC or DC, do not touch, do not test and do not guess.

Unknown sources may be connected to generators, the grid, solar systems, batteries or damaged equipment.

Treat all unknown electrical sources as live and dangerous until they are positively identified and isolated.

When in doubt, STOP and seek qualified help if available.

IDENTIFY FIRST



- Do you know where it comes from?
- Is it AC or DC?
- What could it be connected to (grid, generator, solar, battery)?
- If you do not know, treat it as live and dangerous.

DO NOT TOUCH



- Do not touch unknown cables, boxes or equipment.
- Do not test with your body or makeshift tools.
- Do not assume it is low voltage just because it looks small or damaged.
- Keep yourself and others away.

DO NOT TEST



- Do not use a multimeter unless you know it is a low-voltage DC source and you know how to test.
- Do not use homemade testers or improvised methods.
- Testing an unknown source can be dangerous and may damage your meter or cause injury.

KEEP DISTANCE



- Keep a safe distance.
- Prevent others, especially children, from approaching.
- Use barriers, tape or clear warning signs if possible.
- Avoid working alone in an unknown area.

SEEK HELP IF NEEDED



- If available, seek help from a qualified person or responsible team member.
- Provide clear information about the location and what you found.
- Do not move or modify the equipment unless instructed to do so by someone qualified.

COMMON MISTAKES

THESE CAN CAUSE SERIOUS INJURY OR DEATH.



Touching to "see what happens".



Using a multimeter on an unknown source.



Assuming it is low voltage because it looks small.



Using improvised tools or methods.



Allowing others, especially children, close.

KEY MESSAGES

- Unknown source or voltage = STOP.
- Do not touch, do not test, do not guess.
- Keep yourself and others away.
- Prevent children and bystanders from approaching.
- Use clear barriers or warning signs if possible.
- Seek qualified help if available.
- When in doubt, STOP and reassess.

P12 LOW VOLTAGE DOES NOT MEAN NO DANGER

EVEN AT LOWER VOLTAGES, SHORT CIRCUIT, HIGH CURRENT, FIRE, SPLASH, BATTERY AND MECHANICAL RISKS CAN STILL CAUSE SERIOUS INJURY OR DEATH.

GREEN
SAFETY AWARENESS FOR EVERYONE



LOW VOLTAGE CAN STILL BE SERIOUS

Even low voltage (e.g. 12 V or 24 V DC) can cause serious injury or death due to high current, short circuits, fire, burns, battery explosions, splashes or moving parts.

Do not be careless just because the voltage is lower. Always follow safe procedures, use proper protection and be aware of all hazards in the environment.

SHORT CIRCUIT



- High current can flow very quickly.
- Can cause fire, burns and equipment damage.
- Keep tools and metal objects away from live terminals.
- Use correct fuses and cable sizes.

FIRE RISK



- Short circuits, overcurrent and damaged cables can cause fire.
- Keep combustible materials away from batteries and electrical equipment.
- Use correct fuses and protection devices.
- Check for heat, smell, smoke or damage regularly.

BATTERY HAZARDS



- Batteries can deliver very high current.
- Can explode if damaged, overcharged or near flames.
- Can leak corrosive acid that can injure skin and eyes.
- Keep batteries secure, upright and protected.
- Use eye protection and gloves when working with batteries.

SPLASH & WET CONDITIONS



- Water, rain, mud and sweat increase the risk of electric shock and short circuits.
- Keep electrical parts dry and off the ground.
- Use covers, shelters or waterproof containers.
- Wipe and dry equipment before use if it is wet.

MECHANICAL RISKS



- Moving parts (belts, chains, shafts, fans) can pull in clothing or fingers.
- Can cause severe cuts, fractures or death.
- Keep hands, hair, clothing and tools clear.
- Use guards and maintain equipment properly.

COMMON MISTAKES

THESE CAN CAUSE SERIOUS INJURY, FIRE OR DEATH.



Using damaged or frayed cables.



Working in wet or muddy conditions.



No fuse or overloaded wiring.



Leaving metal tools near live terminals.



Keeping flammable materials nearby.

KEY MESSAGES

- Low voltage does not mean no danger.
- High current, fire, splash, battery and mechanical risks can still cause serious injury or death.
- Use correct protection, tools and safe working methods.
- Keep the work area dry, tidy and free from unnecessary clutter.
- Be aware of all hazards in the environment.
- If in doubt, STOP and get advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

P13 230V / BUILDING WIRING / INDUSTRIAL CABLES

RECOGNISE, KEEP AWAY, ISOLATE IF SAFE — PUBLIC: IDENTIFY ONLY.

RED
PUBLIC: IDENTIFY ONLY



HIGH VOLTAGE CAN KILL

230V building wiring and industrial cables can cause electric shock, severe burns, fire and death.

These systems are for qualified people only.

Do not touch, do not modify and do not attempt to fix or rewire.

Identify, keep away, isolate the area if safe and report to qualified personnel or authorities.

RECOGNISE



- Look for warning signs, labels or 230V markings.
- Building wiring is usually AC 230V in NZ.
- May be in cables, junction boxes, distribution boards or underground.
- If unsure, treat as dangerous.

KEEP AWAY



- Do not approach live or damaged electrical systems.
- Keep a safe distance.
- Prevent others, especially children, from entering.
- Use barriers or warning signs if possible.
- Assume cables and equipment may still be live.

ISOLATE (IF SAFE)



- Only if you know what it is and it is safe to do so.
- Turn off the main switch or isolator (e.g. at a distribution board).
- Do not open or remove panels unless you are trained.
- If you cannot safely isolate, keep away and call qualified help.

DO NOT MODIFY



- Do not cut, join, tap or repair 230V wiring.
- Do not use household wiring or industrial cables for DIY.
- Do not attempt to bypass fuses, breakers or switches.
- Do not use metal tools near unknown or live wiring.
- Do not assume it is safe even if it looks broken.

CALL QUALIFIED HELP



- Contact your power company, building manager or qualified electrician.
- Report damaged power lines, panels or exposed cables.
- Keep the area clear until qualified personnel arrive.
- Provide clear information about the location and what you found.

COMMON MISTAKES

THESE CAN CAUSE SERIOUS INJURY, FIRE OR DEATH.



Touching or moving damaged cables.



Trying to cut, join or repair wiring.



Opening electrical panels without training.



Using metal tools near live wiring.



Assuming it is safe because it looks damaged.

KEY MESSAGES

- 230V building wiring and industrial cables can kill.
- Recognise, keep away and isolate if safe.
- Do not touch, do not modify and do not DIY.
- Keep others, especially children, out of the area.
- Call qualified personnel or your power company.
- If in doubt, STOP.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

P14

BEFORE YOU SALVAGE:
FINAL GO / NO-GO CHECK

ENVIRONMENT SAFE ENOUGH, SOURCE KNOWN/ISOLATED, TOOLS AND PROTECTION READY. ESCAPE ROUTE CLEAR. OTHERWISE STOP.

GREEN
SAFE PROCEDURE FOR EVERYONE



DO THE CHECK FIRST

Only salvage if the environment is safe enough, the source is known and isolated, and you have the right tools and protection.
Always have a clear escape route.

If in doubt, STOP.

1. CHECK ENVIRONMENT



- Make sure the area is stable and safe to enter.
- Watch for damaged buildings, falling objects and unstable structures.
- Check for signs of fire, gas, chemicals, flooding or other hazards.
- If the environment is not safe enough, do not enter.

2. CONFIRM SOURCE AND ISOLATE



- Confirm what the item is and where it comes from.
- Make sure the power source is isolated (e.g. generator off, main switch off, battery disconnected).
- Do not assume it is safe just because it looks unused or damaged.
- If you cannot isolate it, do not touch it.

3. TOOLS & PROTECTION READY



- Use appropriate tools for the job.
- Wear protective gear: gloves, safety glasses, long sleeves, sturdy shoes and a hat.
- Prepare containment for sharp or hazardous items.
- Do not start if you do not have the right tools or protection.

4. ESCAPE ROUTE CLEAR



- Know how to get out quickly if the situation changes.
- Keep the route clear of obstacles.
- Do not work in places where you could be trapped.
- Always be aware of your surroundings while working.

5. OTHERWISE STOP



- If you are unsure about the environment, the source or the safety, STOP.
- Do not take unnecessary risks.
- Seek help or advice from a qualified person if available.
- It is better to leave it than risk serious injury or death.

COMMON MISTAKES THESE CAN BE VERY DANGEROUS.



Entering an unstable or unsafe area.



Touching or moving equipment without isolating the power.



No or inadequate protective gear.



Blocked or no clear escape route.



Rushing or working alone when it is not safe.

KEY MESSAGES

- Environment safe enough, source known and isolated.
- Tools and protection ready.
- Escape route clear.
- If in doubt, STOP.
- Do not take unnecessary risks.
- Seek qualified help if available.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

A01 SAFE SEARCH – ENVIRONMENT FIRST

SCREEN FIRE, WATER, STRUCTURE, TRAFFIC AND MECHANICAL HAZARDS BEFORE LOOKING AT EQUIPMENT.

GREEN
SAFE PROCEDURE FOR EVERYONE



CHECK THE ENVIRONMENT FIRST

Before you look at or touch any equipment, check the area for fire, water, structural damage, traffic and mechanical hazards. An unsafe area can quickly become life-threatening.

Only proceed if the environment is stable and safe to enter.

If it is not safe, STOP.

1. FIRE HAZARDS



- Look for smoke, fire, hot surfaces and burned materials.
- Check for fuel, gas cylinders, chemicals or leaking fluids.
- Keep a safe distance until any fire risk is controlled.
- Do not enter if you can smell gas or see active fire.

2. WATER HAZARDS



- Look for flood water, wet ground, standing water or possible rising water.
- Keep away from water near electrical equipment.
- Do not work in wet conditions unless essential and safe.
- If the area is flooded, STOP and reassess.

3. STRUCTURAL HAZARDS



- Check for unstable structures, falling objects and damaged roofs, walls or supports.
- Look for loose materials that could fall while you are working.
- Do not enter unstable or unsafe buildings.
- Keep clear and reassess from a safe location.

4. TRAFFIC HAZARDS



- Watch for vehicles, machinery or other people in the area.
- Be aware of moving traffic, work vehicles and equipment.
- Keep out of vehicle paths and operating zones.
- Use high-visibility clothing if near roads or active areas.

5. MECHANICAL HAZARDS



- Look for moving parts, belts, props, fans or stored energy (mechanical, hydraulic, pneumatic).
- Keep clear of machinery.
- Do not touch or operate unknown or damaged equipment.
- Make sure the area is stable before approaching.

COMMON MISTAKES

THESE CAN LEAD TO SERIOUS INJURY OR DEATH.



Entering while there is smoke or fire.



Working in water or wet conditions.



Ignoring unstable buildings or falling objects.



Working near traffic or moving machinery.



Touching or operating unknown equipment.

KEY MESSAGES

- Screen fire, water, structure, traffic and mechanical hazards before looking at equipment.
- Only enter if the environment is stable and safe.
- Keep clear of all hazards.
- If it is not safe, STOP.
- A safe environment is the foundation for all further work.
- Look after yourself and others.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

A02 LABEL & PROVENANCE – WHAT IS IT WORTH TAKING?

CHECK LABELS, MARKINGS AND CONDITION BEFORE REMOVAL. TAKE ONLY EQUIPMENT THAT IS SAFE, USEFUL AND REALISTIC TO CARRY AND USE.

GREEN
SAFE PROCEDURE FOR EVERYONE



CHECK BEFORE YOU TAKE

Not everything is worth taking. Check the label, type, voltage, power rating, condition and size/weight. Only take items that you can safely remove, carry and that are useful for your off-grid power system.

If in doubt, leave it.

1 FIND THE LABEL



- Look for nameplates, labels or stamped markings.
- Find the manufacturer, model, voltage, power (kW/W), and type.
- Look for warning labels or special requirements.
- If you cannot find any label or marking, treat it as UNKNOWN.

2 CHECK KEY INFORMATION



- Confirm voltage (e.g. 12V, 24V, 48V, 230V AC).
- Check the type (battery, motor, inverter, charger, controller etc).
- Check the rated power/capacity (kW, W, Ah).
- Note any safety warnings or special handling requirements.

3 ASSESS CONDITION



- Check for obvious damage: cracks, broken casings, burnt smell or water damage.
- Look for missing parts, loose wires or corrosion.
- Rotate moving parts if safe to do so (should turn freely).
- Do not take items that are severely damaged or unsafe.

4 CONSIDER SIZE, WEIGHT AND USEFULNESS



- Can you safely remove it with the tools you have?
- Is it a realistic size and weight to carry?
- Will it be useful for your off-grid power system?
- If it is too heavy, too large or not useful, leave it.

5 DECIDE / TAKE OR LEAVE



- Take items that are labelled, identifiable, in reasonable condition and useful.
- Leave items that are unlabelled, damaged, unsafe or not needed.
- Do not take more than you can safely carry and store.
- Take care not to create further hazards while removing items.

COMMON MISTAKES

THESE CAN WASTE EFFORT OR CAUSE SERIOUS RISK.


Taking unlabelled or unknown equipment.


Taking damaged or burnt equipment.


Taking items that are too heavy or too large.


Taking items that are not useful for off-grid power.


Removing items unsafely and creating new hazards.

KEY MESSAGES

- Check labels, type, voltage, power rating and condition.
- Take only equipment that is safe, useful and realistic to carry.
- If it is unlabelled, damaged or unsafe, leave it.
- Do not take more than you can safely remove and transport.
- Look after yourself and others.
- When in doubt, leave it.

A03 VISUAL REJECT LIST – DO NOT TAKE

REJECT BURNT, SWOLLEN, LEAKING, WATER-IMMERSED OR BROKEN EQUIPMENT.
ONLY TAKE ITEMS THAT ARE SAFE, USEFUL AND REALISTIC TO CARRY AND USE.

GREEN
SAFE PROCEDURE FOR EVERYONE



IF IT LOOKS DANGEROUS, LEAVE IT

Do not take items that are burnt, swollen, leaking, water-immersed, severely damaged or unsafe. These can cause fire, explosion, electric shock or chemical harm, even if they look useful.

When in doubt, leave it.

1 BURNT OR OVERHEATED



- Burn marks, melted plastic or insulation.
- Strong burnt smell.
- Discoloured or charred parts.
- Likely internal damage.
- High risk of fire or electric shock. Do not take.

2 SWOLLEN OR LEAKING



- Swollen or deformed case.
- Leaks, wet stains or crystals.
- Sour or chemical smell.
- Lithium batteries, lead-acid and other cells can be dangerous.
- High risk of fire, explosion or chemical harm. Do not take.

3 WATER-IMMERSED



- Been in flood water, seawater or submerged for a long time.
- Mud, silt or heavy corrosion inside.
- Water can damage insulation, bearings and electronics.
- High risk of short circuit, fire or failure. Do not take.

4 CRACKED OR BROKEN



- Cracked housing or missing parts.
- Exposed internal windings or electronics.
- Severely bent, crushed or broken terminals.
- Unlikely to be safe or useful. Do not take.

5 UNKNOWN OR SUSPICIOUS



- No clear label, model or rating.
- Label is unreadable or removed.
- Look for signs of hidden damage, modification or poor quality.
- If you cannot identify what it is or how it was used, do not take.
- Unknown items can be unsafe and not worth the risk.

6 EXAMPLES YOU CAN CONSIDER TAKING



Used motor/alternator (no major damage) | Lead-acid battery (not swollen or leaking) | Inverter / charger (clean and dry) | Junction box / controls (intact and dry) | Cables and connectors (good condition)

KEY MESSAGES

- Reject burnt, swollen, leaking, water-immersed or broken equipment.
- Only take items that are safe, useful and realistic to carry and use.
- Check labels, type, voltage and condition.
- If you cannot identify it or it looks suspicious, leave it.
- Do not take unknown, damaged or unsafe items.
- When in doubt, leave it.

A04 PHOTOGRAPH & LABEL BEFORE REMOVAL

PRESERVE ORIGINAL CONNECTIONS, POSITIONS AND CONTEXT.
TAKE CLEAR PHOTOS AND LABEL PARTS BEFORE YOU DETACH OR MOVE THEM.

GREEN
SAFE PROCEDURE FOR EVERYONE



RECORD BEFORE YOU REMOVE

Once something is disconnected, it can be hard or impossible to remember how it was originally connected. Take clear photos, label cables and terminals, and note the position and orientation of parts before removal. Good records help you reassemble safely and correctly.

If you do not record it, you may not be able to reinstall or use it later.

1 TAKE CLEAR PHOTOS



- Take multiple photos from different angles.
- Include the whole unit and close-ups of terminals, labels and wire routing.
- Make sure photos are clear and well lit.
- If possible, take a video walk-around before you start removal.

2 LABEL CABLES AND TERMINALS



- Use tape, tags or markers to label each cable and terminal.
- Use simple, clear names (e.g. ALT+, ALT–, IGN, SENSE).
- Label both ends if possible.
- Do not remove labels until reinstallation is complete.

3 NOTE KEY INFORMATION



- Record the manufacturer, model, part number and voltage/current rating (e.g. 12V 80A, 24V, 48V).
- Note any warnings or special requirements on the label.
- If there is no label, take clear photos of any markings and measure size/shape for later identification.

4 RECORD POSITION AND CONTEXT



- Take a photo showing the position of the part in the vehicle, machine or system.
- Note the orientation (front, back, left, right, top).
- Show nearby parts, brackets and how cables are routed.
- If there are multiple similar parts, mark their location or number them.

5 REMOVE ONLY AFTER RECORDING



- Do not remove or disconnect anything until you have taken photos and added labels.
- Keep the original arrangement as much as possible.
- If you must remove parts, keep cables, brackets and bolts together and labelled.
- Store small parts in a labelled bag or container.

COMMON MISTAKES

THESE CAN LEAD TO CONFUSION, WRONG CONNECTIONS OR DAMAGE.



No photos, no labels.



Removing cables without marking.



Mixing similar parts together.



Missing or unreadable label.



Losing small parts, bolts or brackets.

KEY MESSAGES

- Take clear photos before removal.
- Label all cables, terminals and key parts.
- Record manufacturer, model, voltage/current and warnings.
- Show position and orientation in the system.
- Do not remove anything until you have recorded it.
- Keep parts and fasteners together and labelled.
- Good records make safe reassembly and future use possible.

A05 DE-ENERGISED REMOVAL – LOW-VOLT SALVAGE

REMOVE KNOWN LOW-VOLTAGE PARTS ONLY.

MAKE SURE THEY ARE DE-ENERGISED, DISCONNECTED AND SAFE TO HANDLE.

AMBER
CAUTION REQUIRED
BASIC KNOWLEDGE



ONLY REMOVE WHEN DE-ENERGISED

Remove only known low-voltage parts that are completely de-energised and disconnected from all power sources. Confirm that the area is safe and stable. If you are unsure about the voltage or condition, STOP and do not remove the item.

When in doubt, leave it.

1 ISOLATE AND CONFIRM OFF



- Disconnect from all power sources (battery, charger, generator, solar, grid).
- Remove cables and make sure no power can feed back into the equipment.
- If available, use a multimeter to confirm 0 V or no continuity.
- Treat as LIVE if unsure.

2 CHECK CONDITION



- Check for obvious damage, cracks, water, rust or burnt smell.
- Look for missing parts, loose wires or broken mounts.
- If the unit is heavily damaged, full of water or contaminated, do not remove — leave it.

3 REMOVE SAFELY



- Use appropriate tools (spanners, sockets, screwdrivers).
- Support the weight before loosening the last bolt.
- Disconnect and remove cables carefully.
- Avoid sharp edges, hot surfaces and pinch points.
- Keep others clear while removing.

4 KEEP PARTS TOGETHER



- Keep the unit with its original brackets, connectors, bolts and key parts.
- Use tags or tape to label the unit (e.g. “12V ALT”, “Starter Motor”, “12V Pump”).
- Keep small parts (bolts, washers) in a labelled bag or container.
- Take a photo of the complete unit before and after removal.

5 STORE AND PROTECT



- Store removed parts in a dry, clean and stable location.
- Protect from rain, dirt and further damage.
- Keep labels attached and store small parts with the unit.
- Do not pile heavy items on top.
- Plan for testing and use later when conditions are safe.

COMMON MISTAKES

THESE CAN CAUSE INJURY, DAMAGE OR LOSS OF USE.



Removing while still connected to power.



Taking water-damaged or heavily corroded parts.



Losing original parts, bolts or connectors.



No label or photos before removal.



Dropping or damaging parts during removal.

KEY MESSAGES

- Remove only known low-voltage parts.
- Make sure the equipment is de-energised and disconnected.
- Check condition before removal.
- Use appropriate tools and safe work practices.
- Keep original parts together and label them.
- Store removed parts safely for future testing and use.
- If unsure about voltage, condition or safety — leave it.

A06 SALVAGE CABLES, TERMINALS & FUSE BOXES

PREFER INTACT HARNESSES AND ORIGINAL PROTECTION HARDWARE.

CHECK CONDITION, REMOVE DAMAGE AND KEEP WHAT IS SAFE, USEFUL AND REALISTIC.

AMBER
CAUTION REQUIRED
BASIC KNOWLEDGE



USE ORIGINAL PARTS WHEN POSSIBLE

Vehicle, machinery and equipment wiring harnesses, connectors, terminals, fuse boxes and relays are designed to work together and are safer and more reliable than improvised substitutes. Salvage intact parts, re-check their condition and remove any that are damaged, burnt, corroded or water-contaminated.

When in doubt, leave it.

1 FIND AND IDENTIFY



- Look for complete harness sections, connectors, terminals, fuse boxes and relays.
- Prefer original equipment from the same vehicle or machine.
- Check for part numbers or identifying marks.
- Set aside anything that looks damaged or unsafe.

2 CHECK CONDITION



- Look for cuts, cracks, melted insulation, burn marks or crushed sections.
- Check for corrosion on terminals and connectors.
- Flex the cable gently to check for hidden breaks.
- Water, mud or salt damage can hide corruption inside insulation — if unsure, leave it.

3 PREPARE AND CLEAN



- Remove dirt, corrosion and old tape.
- Clean metal terminals to bright metal if possible.
- Trim back damaged or brittle insulation.
- Do not overheat terminals when cleaning.
- If the cable is stiff, cracked or discoloured, cut it back or do not use it.

4 SALVAGE COMPLETE SETS



- Keep fuse boxes, relays and connectors as complete sets.
- Label or tag harnesses if there are multiple similar parts.
- Salvage mounting brackets and clips where possible.
- Keep fuses of the correct type and rating.
- Do not mix unknown fuses or bypass protection devices.

5 KEEP OR REJECT



- Keep parts that are intact, clean, identifiable and in reasonable condition.
- Reject parts that are cracked, burnt, heavily corroded, water-damaged or modified.
- Do not use unknown or non-matching connectors.
- When in doubt, leave it and find a better part.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, ELECTRIC SHOCK OR EQUIPMENT FAILURE.



Using melted or burnt cables.



Keeping heavily corroded terminals.



Relying on tape instead of proper repair.



Mixing unknown connectors.



Using damaged fuse boxes or relays.

KEY MESSAGES

- Prefer intact harnesses and original protection hardware.
- Check condition and remove damaged, burnt or corroded parts.
- Clean and prepare parts properly.
- Keep complete sets (connectors, fuse boxes, relays).
- Use the correct fuses and do not bypass protection.
- Do not use unknown or unsafe parts.
- When in doubt, leave it.

A07 COMPLETE MODULES BEFORE BARE BOARDS

PREFER CAR CHARGERS, LAMPS, CONNECTORS AND ENCLOSED MODULES.

USE COMPLETE, INTACT UNITS FROM THE SAME EQUIPMENT WHERE POSSIBLE.

GREEN
LOW RISK
BASIC KNOWLEDGE



USE ORIGINAL, COMPLETE MODULES

Prefer intact car chargers, lamps, connectors and enclosed modules from the same equipment. They are designed to work together and are safer and more reliable than bare boards or loose parts. Check their condition and remove any that are damaged, burnt, corroded or water-contaminated.

When in doubt, leave it.

1 IDENTIFY USEFUL MODULES



- Look for complete modules: car chargers, USB adapters, LED lamps, DC converters, battery chargers, power banks, and enclosed control modules.
- Prefer intact units from the same vehicle or equipment.
- Keep original cables, connectors and mounting hardware if available.

2 CHECK CONDITION



- Look for cracks, broken mounts, missing terminals or melted plastic.
- Check for signs of water ingress, corrosion, burning or overheating.
- If damaged, corroded or water-contaminated, set it aside.
- Do not open sealed modules unless it is necessary and you know what you are doing.

3 KEEP IT COMPLETE



- Keep each module with its original connectors, cables and any control box.
- Do not cut off useful connectors.
- Complete units are easier and safer to test and use later.
- If a module has removable cables, keep them labelled and matched.

4 MATCHED SYSTEMS



- Prefer modules designed to work together, such as: car charger + cable + device.
- Use original fuses, plugs and sockets where possible.
- Keep voltage and connector types matched (e.g. 12V auto systems).
- Do not mix unknown modules from different systems unless they are clearly compatible.

5 STORE OR FURTHER TEST



- Keep good modules clean, dry and protected.
- Label or tag each module and its use (e.g. 12V USB charger, LED work light).
- Store in a container to avoid damage.
- Test safely later following the relevant cards in this series before connecting to a power source.

COMMON MISTAKES

THESE CAN LEAD TO DAMAGE, FIRE OR INJURY.



Using damaged, cracked or burnt modules.



Stripping to bare boards too early.



Cutting off useful connectors or cables.



Mixing unknown modules from different systems.



Using wet, corroded or water-damaged modules.

KEY MESSAGES

- Prefer car chargers, lamps, connectors and enclosed modules.
- Use complete, intact units from the same equipment.
- Check condition and remove damaged, burnt or corroded modules.
- Keep original connectors, cables and hardware.
- Complete modules are safer and more reliable than bare boards.
- Do not mix unknown modules from different systems.
- Clean, label, store and test safely before use.
- When in doubt, leave it.

A08

WET / FLOODED EQUIPMENT – DO NOT POWER IT TO TEST

WATER CAN CAUSE HIDDEN DAMAGE AND DANGEROUS FAULTS.

DRY, INSPECT, CLEAN AND CHECK BEFORE ANY FURTHER USE.

GREEN
LOW RISK
BASIC KNOWLEDGE



KEEP IT DRY AND INSPECT FIRST

If equipment has been in rain, flood water, mud or high humidity, do not power it. Water can cause short circuits, corrosion and hidden damage. Dry thoroughly, clean carefully and inspect for signs of water ingress before testing or use. If in doubt, leave it out of service.

When in doubt, leave it.

1 DO NOT POWER IT



- Do not connect to a battery, charger, generator or any power source.
- Water inside can cause short circuits and further damage.
- Even if it looks dry outside, moisture may still be inside.
- Let it dry and inspect first.

2 DRY THOROUGHLY



- Remove from water and mud as soon as possible.
- Wipe off mud and visible debris.
- Allow to dry in a warm, well-ventilated, shaded area.
- Use a clean, dry cloth and natural air flow. Patience is safer than damage.

3 INSPECT CAREFULLY



- Check for water marks, mud, corrosion or white/green residue.
- Inspect connectors, terminals, seals, cables and mounting points.
- Look inside enclosures if safe to do so.
- If you see heavy corrosion or damage, do not use it.

4 CLEAN IF APPROPRIATE



- Remove dirt, salt or mud using a soft brush.
- Clean metal terminals to bright metal if possible.
- Remove corrosion carefully.
- Do not force open sealed units unless you know what you are doing.
- Allow to dry again after cleaning.

5 TEST LATER IF SAFE



- Only test after it is completely dry, clean and inspected.
- Check that connectors are clean, dry and undamaged.
- Test in a safe, controlled way using the relevant cards in this series.
- If there is any doubt about its condition, keep it out of service or use only for non-critical purposes.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, ELECTRIC SHOCK OR EQUIPMENT FAILURE.



Powering wet or damp equipment.



Ignoring mud or water inside connectors.



Using direct heat or strong sun to dry units.



Forcing open sealed modules too early.



Using corroded or damaged terminals.

KEY MESSAGES

- Do not power wet or flood-damaged equipment.
- Dry thoroughly, clean carefully and inspect for corrosion.
- Check connectors, terminals, seals, cables and enclosures.
- Remove dirt, mud or salt and clean to bright metal if possible.
- Allow to dry again after cleaning.
- Only test when completely dry and in safe condition.
- If in doubt, leave it out of service or use only for non-critical use.
- A damaged or corroded part may need replacement.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

B01

CONVENTIONAL 12V VEHICLES – WHAT MAY BE USED

ONLY CLEARLY CONVENTIONAL 12V SYSTEMS.

KNOW WHAT YOU CAN SAFELY USE BEFORE YOU SALVAGE OR CONNECT ANYTHING.

GREEN
LOW RISK
BASIC KNOWLEDGE



USE ONLY CLEARLY 12V VEHICLES

This card covers conventional 12V vehicles such as most petrol and diesel cars, 4WDs, utes, vans and light trucks. These typically use a single 12V battery and 12V electrical system. Only work with clearly identified 12V systems in reasonable condition.

If unsure, stop and get more information.

1 IDENTIFY 12V SYSTEM



- Look for clear 12V labels on the battery, under the bonnet and in the owner's manual (sticker or plate).
- Most cars, 4WDs, utes and light trucks use a single 12V battery system.
- Typical 12V batteries are labelled "12V" and are flooded, AGM or EFB types.
- If the system is not clearly 12V, do not use it.

2 TYPICAL 12V VEHICLES



- Common 12V vehicles include petrol and diesel cars, 4WDs, utes, vans and light trucks.
- Many use a single 12V battery with an alternator and simple 12V electrical system.
- These vehicles are common sources of usable parts such as batteries, alternators, starter motors, wiring, fuses and connectors.

3 KEY 12V COMPONENTS



Main components include:

- 12V battery (flooded, AGM, EFB)
- Alternator (charges battery)
- Starter motor (cranking)
- Fuses and relays
- 12V wiring harnesses
- Connectors, terminals and earth points
- Accessory sockets (e.g. 12V / cigarette lighter, USB adapters)

4 CONDITION AND SAFETY



- Only use vehicles and parts in reasonable condition.
- Check for obvious damage, burn marks, corrosion, melted insulation or missing parts.
- Do not use vehicles that have been flooded, burnt or heavily damaged unless you fully understand the risks.
- Inspect wiring, terminals and connectors before use.

5 DO NOT USE HIGH-VOLTAGE / HYBRID / EV



- Do not use hybrid, mild-hybrid or electric vehicles in this handbook.
- These vehicles may use high voltage (e.g. 48V, 200V+), which is dangerous and requires specialist knowledge.
- Do not open oraage high-voltage cables, inverters or battery packs.
- If unsure whether a vehicle is hybrid or EV, treat it as high voltage and do not use it.

COMMON MISTAKES

THESE CAN LEAD TO SERIOUS INJURY, FIRE OR EQUIPMENT DAMAGE.



Using hybrid or EV high-voltage systems.



Salvaging from flood-damaged vehicles without proper checks.



Using burnt or heavily damaged vehicles.



Ignoring corrosion or melted wiring.



Mixing unknown voltage systems or modified vehicles.

KEY MESSAGES

- Use only clearly conventional 12V vehicles.
- Identify 12V batteries and 12V components.
- Common sources include batteries, alternators, starters, fuses, relays and wiring.
- Check condition and look for damage or corrosion.
- Do not use hybrid, mild-hybrid or electric vehicles.
- If unsure, stop and get more information.

B02 HYBRID / MHEV / EV / 48V — STOP

ABSENCE OF ORANGE CABLE DOES NOT PROVE A SINGLE LOW-VOLTAGE SYSTEM.

ASSUME HIGH-VOLTAGE MAY BE PRESENT. IDENTIFY BEFORE DOING ANY WORK.

RED
HIGH RISK
SPECIALIST KNOWLEDGE REQUIRED



DO NOT WORK ON UNKNOWN HYBRID / EV SYSTEMS

Many modern vehicles use high-voltage systems (e.g. 48V, 200V, 300V, 400V+). The absence of orange cables does NOT mean a low-voltage system. These systems can cause serious injury or death. Without proper training, tools and confirmed identification, do not open, disconnect or work on high-voltage components.

If unsure, STOP and get specialist advice.

1 IDENTIFY VEHICLE TYPE



- Look for badges: Hybrid, Plug-in Hybrid (PHEV), MHEV, EV, 48V.
- Check stickers in the engine bay, door frame or under the bonnet.
- Use the owner's manual if available (offline copy).
- If you cannot clearly confirm it is a conventional 12V vehicle, assume high-voltage may be present.

2 DO NOT RELY ON ORANGE CABLES



- Absence of orange cable does NOT prove a low-voltage system.
- Some vehicles use hidden high-voltage wiring and shielded cables.
- MHEV / 48V systems may not use orange cables but can still be dangerous.
- Only clear identification and documentation can confirm system type.

3 HIGH-VOLTAGE COMPONENTS



- Common high-voltage parts: inverter, traction battery, DC-DC converter, onboard charger, high-voltage cables and junction boxes.
- These can carry 48V, 200V, 300V, 400V+.
- Voltage can remain even after the vehicle is turned off.
- Do not open enclosures, remove covers or disconnect high-voltage components.

4 LEAVE TO SPECIALISTS



- High-voltage systems require specialist training, tools and procedures.
- Do not attempt to disable, remove or salvage high-voltage parts.
- Do not cut high-voltage cables.
- Do not open battery packs.
- Even damaged vehicles can retain dangerous voltages.
- Leave high-voltage systems for qualified professionals.

5 FOCUS ON LOW-VOLTAGE ONLY



- If you must work on the vehicle, limit yourself to clearly identified 12V systems only (e.g. 12V battery, lights, wipers, aftermarket accessories).
- Do not assume the whole vehicle is 12V.
- Check the owner's manual for 12V battery location and isolation method.
- When in doubt, do not proceed.

COMMON MISTAKES — THESE CAN LEAD TO SERIOUS INJURY OR DEATH.



Cutting or disconnecting high-voltage cables.



Opening battery packs or enclosures.



Assuming no orange cable means it is 12V only.



Working on inverter or power electronics.



Salvaging high-voltage parts without proper training.

KEY MESSAGES

- Assume high-voltage may be present in hybrid, MHEV, EV or 48V vehicles.
- Absence of orange cable does not prove a 12V-only system.
- Do not open, disconnect or work on high-voltage components.
- Only work on clearly identified 12V systems.
- Use the owner's manual if available.
- Leave high-voltage systems to qualified specialists.
- When in doubt, STOP and get specialist advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

B03 VEHICLE SRS — DO NOT TOUCH

NO UNIVERSAL WAIT TIME; OEM PROCEDURE REQUIRED.

AIRBAGS, SEATBELT PRE-TENSIONERS AND SRS COMPONENTS CAN CAUSE SERIOUS INJURY.

RED
HIGH RISK
SPECIALIST KNOWLEDGE REQUIRED



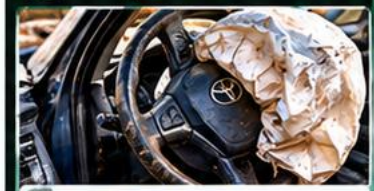
DO NOT TOUCH SRS COMPONENTS

Vehicles are fitted with a Supplemental Restraint System (SRS) including airbags, seatbelt pre-tensioners and control modules. These can deploy without warning and cause serious injury or death.

There is no universal safe waiting time. The correct procedure is in the vehicle manufacturer's service information. If you are not a trained professional with the correct tools and information, do not touch, disconnect or work on SRS components.

Leave SRS work to qualified specialists.

1 IDENTIFY SRS COMPONENTS



- Look for airbags (steering wheel, dashboard, side, curtain).
- Seatbelt pre-tensioners are often at the base of the seatbelt.
- SRS control modules are typically mounted in the cabin (e.g. under seats or console).
- Check the owner's manual if available to identify locations.

2 DO NOT TOUCH / DO NOT DISCONNECT



- Do not disconnect, cut or probe SRS wiring or connectors.
- Do not use test lights, multimeters or other electrical tools on SRS circuits.
- Do not apply power to SRS components.
- Do not attempt to remove airbags, modules or pre-tensioners.

3 POTENTIAL DANGERS



- Airbags and pre-tensioners can deploy with enough force to cause serious injury or death.
- They can be triggered by impact, electrical fault, static electricity or incorrect handling.
- Even removed components can still be dangerous if not handled correctly.

4 FOLLOW OEM PROCEDURE



- Only trained professionals should work on SRS systems.
- Use the vehicle manufacturer's service information for the exact procedure.
- Follow the specified steps, tools and safety precautions.
- If you do not have the correct information and equipment, do not proceed.

5 ALTERNATIVES FOR SALVAGE WORK



- If you need to salvage other parts, work around SRS components and keep them undisturbed.
- Remove non-SRS parts only (e.g. seats, trim, electronics) following general safe practices.
- If in doubt, leave SRS components in place.
- Focus on low-voltage 12V systems only.

COMMON MISTAKES

THESE CAN LEAD TO SERIOUS INJURY OR DEATH.



Disconnecting SRS connectors.



Testing SRS wiring with a multimeter.



Removing airbags without training.



Applying power to SRS components.



Handling removed SRS parts carelessly.

KEY MESSAGES

- Do not touch, disconnect or work on SRS components.
- No universal wait time; follow OEM procedure.
- Only trained professionals with correct tools and information.
- SRS components can deploy without warning.
- If in doubt, leave SRS work to specialists.
- You can still salvage non-SRS parts, keeping SRS components undisturbed.
- Focus on low-voltage 12V systems only.

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B04

TAKE 12V FROM THE ORIGINAL ACCESSORY OUTLET FIRST

PREFER DESIGNED ACCESSORY OUTLET OVER IMPROVISED FLYING LEADS.
USE FACTORY 12V SOCKETS OR OEM ACCESSORY POINTS WHERE AVAILABLE.

GREEN
LOW RISK
BASIC KNOWLEDGE



USE THE ORIGINAL ACCESSORY OUTLET

Use the vehicle's factory 12V accessory outlet (cigarette lighter socket or dedicated accessory socket) where available. It is designed with proper fusing, wiring and protection. This is safer and more reliable than using improvised flying leads or tapping into random wires.

Use OEM accessory outlets first.

1 LOCATE OEM OUTLET



- Find the factory 12V accessory outlet (cigarette lighter socket or dedicated accessory socket).
- Check the owner's manual for its location and maximum current rating.
- Ensure the outlet is in good condition and clean.

2 CHECK RATING



- Confirm the maximum power rating (e.g. 12V, 120W or 10A).
- Ensure your device (charger, lamp, compressor, etc.) is within the rated load.
- Do not overload the circuit.

3 USE CORRECT PLUGS



- Use proper 12V plugs and adapters designed for vehicle use.
- Ensure a firm and correct connection.
- Avoid loose connections that can cause heat, damage or fire.

4 PROTECTED CIRCUIT



- Factory accessory outlets are fused and protected.
- Using the OEM outlet helps prevent electrical faults, short circuits and vehicle damage.
- If the fuse blows repeatedly, stop and investigate.

5 AVOID FLYING LEADS



- Do not use improvised flying leads, exposed wires or random tapping points.
- Avoid cutting, splicing or modifying the vehicle's original wiring.
- Use OEM accessory outlets. first. Only consider alternative methods if no factory outlet is available and with proper protection.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, VEHICLE DAMAGE OR LOSS OF WARRANTY.



Using improvised flying leads.



Tapping into random wiring points.



Overloading the 12V outlet.



Using loose or poor connections.



Using damaged sockets or plugs.

KEY MESSAGES

- [x] Use the vehicle's original 12V accessory outlet first.
- [x] Check the outlet's rating and do not overload it.
- [x] Use proper 12V plugs and adapters.
- [x] The OEM outlet is fused and protected.
- [x] Avoid improvised flying leads or random wiring taps.
- [x] Keep connections clean, firm and in good condition.
- [x] If in doubt, refer to the owner's manual or seek professional advice.

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B05 12V BATTERY — SHORT-CIRCUIT PROTECTION

TERMINAL COVERS, TOOL DISCIPLINE AND OVERCURRENT PROTECTION.

PREVENT SHORT CIRCUITS WHEN WORKING ON THE 12V BATTERY AND CIRCUITS.

AMBER
MEDIUM RISK
INCREASED AWARENESS REQUIRED



PREVENT ACCIDENTAL SHORT CIRCUITS

The 12V battery can deliver very high current. Accidental short circuits can cause fires, burns and serious damage to wiring, modules and the battery. Always use terminal covers, the correct tools and overcurrent protection. Keep metal objects, tools and jewellery away from the battery terminals.

Work safely and protect the 12V system.

1 CHECK TERMINAL COVERS



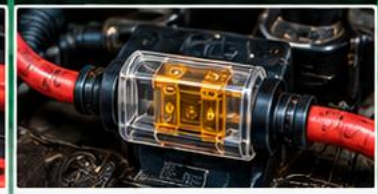
- Ensure positive and negative terminal covers are fitted and in good condition.
- Replace missing or damaged covers.
- Keep terminals clean and dry, free from corrosion.
- Check the battery mounting is secure.

2 USE CORRECT TOOLS



- Use insulated and correctly sized tools.
- Keep metal tools and jewellery away from battery terminals.
- Do not place tools on the battery.
- Remove rings, watches and other metal items before working.

3 OVERCURRENT PROTECTION



- Ensure fuses or fusible links are used for new circuits.
- Use the correct fuse rating for the load.
- Do not bypass, oversize or replace fuses with wire.
- Protect added circuits with overcurrent devices as close to the power source as possible.

4 AVOID SHORT CIRCUITS



- Do not allow tools, cables or metal objects to bridge between terminals.
- Avoid routing cables where they can chafe or be crushed.
- Secure cables and use protective sleeving.
- Disconnect the battery (negative first) if required for specific work.

5 TEST AND VERIFY



- After installation, check for correct voltage and operation.
- Ensure no signs of overheating.
- Verify the fuse rating and protection are correct.
- Keep the battery and wiring layout clean and secure.
- If in doubt, refer to the service manual or seek professional advice.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, BURNS OR SERIOUS VEHICLE DAMAGE.



Exposed or missing terminal covers.



Leaving tools on the battery.



Bypassing fuses or using incorrect ratings.



Loose or unprotected wiring near terminals.



Wearing jewellery or allowing metal objects near the battery.

KEY MESSAGES

- Keep terminal covers fitted and in good condition.
- Use insulated tools and remove jewellery.
- Use correct fuses or overcurrent protection.
- Avoid short circuits and secure wiring.
- Check for correct voltage and operation after work.
- Keep the battery area clean, dry and well secured.
- If in doubt, refer to the owner's manual or seek professional advice.

B06

OTHER COMPLETE STORAGE — POWER BANK / TOOL BATTERY

USE INTACT ORIGINAL INTERFACES AND PROTECTED PACKS ONLY.

POWER BANKS, TOOL BATTERIES AND OTHER COMPLETE STORAGE PRODUCTS ARE DESIGNED, TESTED AND PROTECTED FOR SAFE USE. 完整儲能

GREEN
LOW RISK
BASIC KNOWLEDGE



USE COMPLETE, PROTECTED PRODUCTS

Use power banks, tool batteries and other complete storage products that have built-in protection (BMS), correct charging systems and secure enclosures. Keep them intact and use the original interfaces and charging methods provided by the manufacturer.

Use original, protected units only.

1 IDENTIFY COMPLETE UNITS



- Use only complete, original power banks, tool batteries or portable power stations.
- Check for manufacturer labels, capacity and condition.
- Ensure the enclosure is intact with no swelling, cracks or damage.
- If in doubt, do not use it.

2 USE ORIGINAL INTERFACES



- Use the original charging ports and output interfaces provided by the manufacturer.
- Use genuine or good-quality cables and chargers.
- Do not modify, bypass or force connections.
- Follow the manufacturer's instructions for charging and use.

3 KEEP PROTECTION SYSTEMS



- Complete storage products include built-in protection (BMS, fuses, temperature control, overcurrent and short-circuit protection).
- Do not open, modify or remove the protection electronics.
- Keep units intact and weather-protected.
- Allow proper ventilation during charging and use.

4 STORE AND USE CORRECTLY



- Use within the manufacturer's temperature range.
- Keep away from direct heat, fire and long periods of direct sunlight.
- Do not expose to water, mud or excessive moisture.
- Store in a cool, dry place when not in use.
- Keep away from children and unauthorised access.

5 CHECK REGULARLY



- Inspect regularly for damage, swelling, loose parts or unusual heat.
- Stop using if the unit is damaged, swollen, has leaked, or does not work correctly.
- Follow the manufacturer's advice for disposal or professional repair.

COMMON MISTAKES THESE CAN LEAD TO FIRE, BURNS OR EQUIPMENT FAILURE.



Using damaged, swellen or wet units.



Opening or modifying the unit / removing BMS.



Using loose cells or homemade packs.



Using non-original chargers or cables.



Leaving in high heat or direct sunlight.

KEY MESSAGES

- [x] Use complete, original power banks, tool batteries and other storage products.
- [x] Use intact original interfaces and protected packs only.
- [x] Do not open, modify or bypass protection systems.
- [x] Use genuine chargers, cables and accessories.
- [x] Keep units in good condition, clean and dry.
- [x] Store and use within the manufacturer's guidelines.
- [x] If in doubt, stop using and seek professional advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

C01 WHICH MOTORS MAY GENERATE

SCREEN CANDIDATES; DO NOT PROMISE OUTPUT.

NOT ALL MOTORS ARE SUITABLE FOR GENERATION. CHECK TYPE, CONDITION AND SIZE.

GREEN
LOW RISK
BASIC KNOWLEDGE



IDENTIFY POTENTIAL GENERATOR MOTORS

Many electric motors can generate electricity when driven, but their output depends on the type, size, condition and speed. Suitable candidates include DC motors, car alternators and some AC motors. Not all motors are practical or safe to use. Always inspect, identify and understand the motor before using it for generation.

Screen carefully; do not promise output.

1 COMMON MOTOR TYPES



- Car alternators (automotive alternators).
- Brushed DC motors (e.g. tools, wipers, fans).
- Brushless DC motors (e.g. drone, e-bike, appliances).
- Some AC induction motors (require higher speed and excitation).
- Stepper motors (low power, not usually practical).

2 CHECK CONDITION



- Ensure the motor is complete and undamaged.
- Check for smooth rotation (no grinding or tight spots).
- Inspect bearings, shaft and wiring.
- Look for signs of overheating, burn marks or corrosion.
- Clean dirt and debris.

3 UNDERSTAND OUTPUT



- Output voltage and current depend on motor type, size and speed.
- DC motors usually generate DC voltage when spun.
- AC motors may need external excitation and run at high speed.
- Do not assume any motor will produce useful power.
- Check specifications if available.

4 MATCH TO YOUR USE



- Larger motors (e.g. car alternators) can provide higher output.
- Small motors (e.g. tool motors) are lower power and suitable for small loads only.
- Consider the speed required to generate useful voltage.
- Match the motor to your intended application.
- Do not oversize claims.

5 RESEARCH AND TEST



- Look up the motor type and specifications.
- Test at low speed first and measure the output.
- Confirm the voltage and current are suitable for your intended use.
- If in doubt, seek technical advice or refer to the manufacturer's data.

COMMON MISTAKES

THESE CAN LEAD TO NO OUTPUT, DAMAGE OR SAFETY RISKS.



Assuming all motors can generate.



Using damaged or seized motors.



Expecting high output from small motors.



Ignoring wiring or connection requirements.



Using the wrong type for your application.

KEY MESSAGES

- Many motors can generate electricity when driven.
- Check motor type, condition, size and speed requirements.
- Not all motors are suitable or practical.
- Car alternators and DC motors are common candidates.
- AC motors may need excitation and high speed.
- Do not assume output without testing.
- Match the motor to your intended use.
- If in doubt, refer to specifications or seek professional advice.

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KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
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CO2 MECHANICAL SAFETY BEFORE MOTOR REMOVAL

DE-ENERGISE, STOP ROTATION AND SECURE HEAVY PARTS.

MOVING PARTS CAN CAUSE SERIOUS INJURY. FOLLOW A SAFE SEQUENCE BEFORE DISASSEMBLY.

GREEN
LOW RISK
BASIC KNOWLEDGE



DE-ENERGISE AND SECURE BEFORE REMOVAL

Before removing any motor, make sure all power sources are disconnected, the rotation has stopped completely and the motor is safely secured. Heavy motors can move suddenly, drop or pinch, causing serious injury. Use proper lifting support, correct tools and a stable work area.

Stop rotation, remove power and secure the motor.

1 DISCONNECT POWER



- Turn off all power sources (battery, generator, mains).
- Disconnect and isolate electrical connectors.
- Verify zero voltage with a suitable meter.
- Prevent accidental re-energising (e.g. remove fuse or disable source).

2 WAIT FOR STOP



- Allow the motor to come to a complete stop.
- Do not hold or try to stop it by hand.
- Check that there is no residual rotation.
- Be aware of flywheels and stored mechanical energy.

3 SECURE AND SUPPORT



- Use appropriate lifting equipment or supports.
- Secure the motor to prevent movement, tipping or falling.
- Support heavy parts before removing fixings.
- Consider the motor's weight and centre of gravity.

4 USE CORRECT TOOLS



- Use the correct tools and follow the manufacturer's procedure.
- Remove mounting bolts gradually and evenly.
- Keep clear of pinch points.
- Do not use excessive force that may cause sudden movement or damage.

5 CHECK AND PROCEED



- Confirm the motor is stable and free to remove.
- Check for remaining wiring, brackets or mechanical links.
- Inspect for loose or unexpected movement.
- If in doubt, stop and seek professional advice.

COMMON MISTAKES

THESE CAN LEAD TO SERIOUS INJURY, DROPPED MOTORS OR EQUIPMENT DAMAGE.



Working on the motor while still powered.



Removing the motor before it has stopped.



Not supporting the weight of the motor.



Using incorrect or unsuitable tools.



Allowing the motor to move or fall.

KEY MESSAGES

- De-energise all power sources before motor removal.
- Ensure the motor has completely stopped.
- Use proper lifting support and secure the motor.
- Use the correct tools and follow manufacturer instructions.
- Check for remaining connections and mechanical links.
- Keep the work area stable, clean and safe.
- If in doubt, stop work and seek professional advice.

C03 KEEP SHAFTS, PULLEYS, BRACKETS & PLUGS

PRESERVE FUTURE MOUNTING AND CONNECTION OPTIONS.

KEEP MECHANICAL INTERFACES IN GOOD CONDITION.

GREEN
LOW RISK
BASIC KNOWLEDGE



KEEP ORIGINAL PARTS AND INTERFACES

Shafts, pulleys, brackets and plugs are often important for future mounting and connection. Keep them together, clean and undamaged. These mechanical parts can be difficult or expensive to replace, and they help identify the motor and its intended use.

Preserve future mounting and connection options.

1 KEEP PARTS TOGETHER



- Keep shafts, pulleys, brackets, plugs and accessories together.
- They help identify the motor and its application.
- Do not discard original parts.

2 CHECK CONDITION



- Inspect shafts for wear, bending or damage.
- Check pulleys, brackets and plugs for cracks, missing pieces or excessive wear.
- Clean dirt, rust and debris.

3 KEEP PLUGS



- Retain original plugs and connectors.
- Check terminals are clean and intact.
- Note any labels, markings or pin layout.

4 STORE SAFELY



- Store parts together in a labelled bag or box.
- Protect from moisture, dirt and impact.
- Keep small parts secure and organised.

5 PRESERVE OPTIONS



- Keeping original parts allows future mounting, alignment and connection options.
- Makes later testing, identification and installation easier.
- Avoid loss or mixing with other projects.

COMMON MISTAKES

THESE CAN LEAD TO DAMAGE, LOSS OF FUNCTION OR EXTRA WORK.



Discarding original shafts, pulleys or brackets.



Using damaged or worn pulleys.



Losing plugs or mixing connectors.



Not storing small parts securely.



Keeping parts in different locations.

KEY MESSAGES

- Keep shafts, pulleys, brackets and plugs together.
- Check for damage, wear and clean as needed.
- Retain original connectors and wiring.
- Store parts safely, labelled and organised.
- These parts preserve future mounting and connection options.
- Do not discard or mix with other projects.
- If in doubt, keep the original mechanical interfaces.

C04

2 WIRES / 3 WIRES ARE ONLY CLUES

NEVER EQUATE WIRE COUNT WITH MACHINE TYPE.

MANY DIFFERENT MOTORS CAN HAVE THE SAME NUMBER OF WIRES.

GREEN
LOW RISK
BASIC KNOWLEDGE



WIRE COUNT IS ONLY A CLUE

Different motors can have the same number of wires. For example, many brushed DC motors have 2 wires, many BLDC motors have 3 wires, and some stepper motors also have 4, 6 or more wires. The wire count alone cannot tell you the motor type or how to connect it. Always check other features.

Never equate wire count with machine type.

1 COUNT WIRES



- Count the number of wires.
- 2 wires, 3 wires or more are only a clue, not a definitive identification.
- Do not assume the motor type based on wire count.

2 DO NOT ASSUME



- Do not assume 2 wires = brushed DC.
- Do not assume 3 wires = BLDC.
- Different motors can share the same wire count.
- Use multiple features for identification.

3 CHECK OTHER FEATURES



- Look at the motor body, label, markings and construction.
- Check for magnets, commutator, encoder or other components.
- Consider size, weight and application.
- Use manufacturer datasheets if available.

4 COMPARE EXAMPLES



- 2 wires: often brushed DC (e.g. toy motor, fan, pump).
- 3 wires: often BLDC (e.g. computer fan, RC motor).
- 4 wires: often stepper motor (e.g. 3D printer, CNC).
- But there are exceptions — always verify with other clues.

5 VERIFY BEFORE USE



- Confirm the motor type using multiple features.
- Check specifications and manufacturer information.
- If uncertain, do not connect to a power source.
- Seek professional advice if needed.

COMMON MISTAKES

THESE CAN LEAD TO WRONG CONNECTIONS, DAMAGE OR SAFETY RISKS.



Assuming 2 wires always means brushed DC.



Assuming 3 wires always means BLDC.



Assuming 4 wires always means stepper motor.



Ignoring other physical features (size, label, magnet, commutator).



Connecting without proper identification and testing.

KEY MESSAGES

- Wire count is only a clue, not a definitive identification.
- Different motors can have the same number of wires.
- Use multiple features: appearance, label, magnets, commutator, encoder and construction.
- Compare with examples and check specifications.
- Do not assume the motor type based on wire count.
- If uncertain, do not connect to power and seek professional advice.

C05 VISIBLE BRUSHES / COMMUTATOR — PMDC CLUE

USE MULTIPLE FEATURES BEFORE TESTING.

VISIBLE BRUSHES AND COMMUTATOR SUGGEST PMDC, BUT CONFIRM WITH OTHER FEATURES.

AMBER
MEDIUM RISK
INCREASE AWARENESS
REQUIRED



VISIBLE BRUSHES AND COMMUTATOR ARE A CLUE

Visible carbon brushes and a segmented commutator usually indicate a permanent magnet DC (PMDC) motor. However, do not rely on a single feature. Always check multiple features such as magnets, wiring, label, construction and application before testing or connection.

Use multiple features before testing.

1 LOOK FOR BRUSHES



- Visible carbon brushes are a strong clue for a PMDC motor.
- Usually 1 or 2 brushes press on the commutator.
- Brushes may be on the outside or inside the assembly.

2 CHECK THE COMMUTATOR



- Look for a segmented copper commutator.
- Commutator has multiple copper segments insulated from each other.
- Often used in brushed DC motors.

3 CHECK OTHER FEATURES



- Look for permanent magnets (usually on the stator).
- Check wiring (often 2 wires, but not always).
- Confirm construction, size and application.

4 USE MULTIPLE CLUES



- Use multiple features together: brushes, commutator, magnets, wiring, label and application.
- Do not rely on a single clue.
- If uncertain, treat as unknown and follow safe testing steps.

5 CONFIRM BEFORE TESTING



- Confirm motor type using multiple features.
- Check specifications and manufacturer information if available.
- Only test using safe methods and appropriate current limits.

COMMON MISTAKES

THESE CAN LEAD TO WRONG IDENTIFICATION, INCORRECT TESTING OR DAMAGE.



Assuming visible brushes always means 12V DC.



Ignoring other features such as magnets and wiring.



Confusing with brushless or AC motors.



Relying only on the label without inspection.



Testing or connecting without confirmation.

KEY MESSAGES

- Visible brushes and a segmented commutator are a clue for PMDC motors.
- Use multiple features before testing.
- Do not rely on a single feature.
- Check magnets, wiring, label, construction and application.
- If uncertain, do not connect to a power source.
- Use safe testing methods and appropriate current limits.
- Seek professional advice if needed.

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C06

BLDC / STEPPER — RECTIFICATION

MATCHING MAY BE NEEDED.

DO NOT CONNECT DIRECTLY TO PHONE OR BATTERY.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



NOT DIRECT TO PHONE OR BATTERY

BLDC and stepper motors usually require rectification, driver circuits or electronic matching. They often cannot be connected directly to a phone, power bank or battery. Check the driver, wiring and specifications first, and use the correct controller or driver.

Do not connect directly to phone or battery.

1 IDENTIFY TYPE



- Identify whether it is BLDC or stepper.
- Check labels, markings or manufacturer information.
- Look for number of wires and connectors.

2 CHECK DRIVER



- Look for a dedicated driver or controller.
- Check input voltage and current range.
- Confirm wiring diagram and pin functions.
- Do not bypass required driver electronics.

3 RECTIFICATION / MATCHING



- Many BLDC motors need rectification and proper matching.
- Use suitable ESC or driver for BLDC.
- Use stepper driver for stepper motors.
- Match voltage, current and control signals.

4 DO NOT DIRECT CONNECT



- Do not connect directly to a phone, power bank or battery.
- They may require specific driver circuits.
- Direct connection can damage the device or motor.
- Risk of overheating, fire or permanent damage.

5 VERIFY BEFORE TESTING



- Check datasheets and specifications.
- Verify wiring, control signals and voltage limits.
- Use appropriate driver and current limits.
- If unsure, seek professional advice.

COMMON MISTAKES

THESE CAN LEAD TO DAMAGE, OVERHEATING, FIRE OR INJURY.



Connecting directly to a phone or power bank.



Wrong voltage or current without driver.



Ignoring the required driver or ESC.



Incorrect wiring or pin identification.



No current limit or protection.

KEY MESSAGES

- BLDC and stepper motors usually need a driver or controller.
- Do not connect directly to a phone, power bank or battery.
- Check rectification, voltage, current and control signals.
- Use correct ESC or stepper driver.
- Follow datasheets and manufacturer information.
- Incorrect connection can cause damage, overheating or fire.
- If uncertain, seek professional advice before testing.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

C07

HAND-TURN TEST — NO SHORTING, NO BODY TEST

VERIFY WITH SAFE LOAD/METER ONLY WHERE APPROPRIATE.

TEST USING SAFE METHODS. DO NOT SHORT TERMINALS OR USE YOUR BODY.
HAND-TURN TEST — DO NOT SHORT TERMINALS, DO NOT USE YOUR BODY AS A TESTER.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



TEST SAFELY AND OBSERVE

Hand-turning a motor can give useful clues about its condition, such as smoothness, resistance and possible internal faults. Do not short the terminals, do not use your body as a tester, and only use a safe load or meter where appropriate. Listen, feel and observe, and check for unusual noise, tight spots or rough rotation.

Verify with safe load/meter only where appropriate.

1 PREPARE FOR TEST



- Ensure the motor is securely mounted.
- Keep hands, clothing and tools clear.
- Inspect for loose parts, damage or obvious faults.
- Use appropriate PPE (e.g. gloves, eye protection).

2 HAND-TURN SLOWLY



- Turn the shaft by hand slowly and smoothly.
- Feel for smooth rotation, resistance or tight spots.
- Listen for unusual noise, rubbing or grinding.
- Check if it feels normal for the motor type.

3 USE SAFE METER/LOAD



- Use a suitable meter or safe load where appropriate.
- Check for expected voltage output (for generators) or resistance readings.
- Follow datasheet guidance if available.

4 DO NOT SHORT TERMINALS



- Never short the terminals together.
- Do not intentionally connect directly to a battery or power source.
- Shorting can damage the motor, driver or electronics and create safety risks.

5 CHECK RESULTS



- Observe the results.
- Compare with expected behaviour for this type of motor.
- If uncertain or abnormal, do not proceed.
- Seek professional advice if needed.

COMMON MISTAKES

THESE CAN DAMAGE THE MOTOR, ELECTRONICS OR CAUSE INJURY.



Shorting terminals together.



Connecting directly to a battery.



Using your body as a tester.



Testing with motor not secured.



Using excessive load or incorrect test method.

KEY MESSAGES

- Hand-turn the shaft slowly and observe.
- Use a safe meter or appropriate load where suitable.
- Do not short the terminals.
- Do not use your body as a tester.
- Check for smooth rotation, noise and abnormal resistance.
- Compare with expected behaviour for the motor type.
- If uncertain, do not proceed and seek professional advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

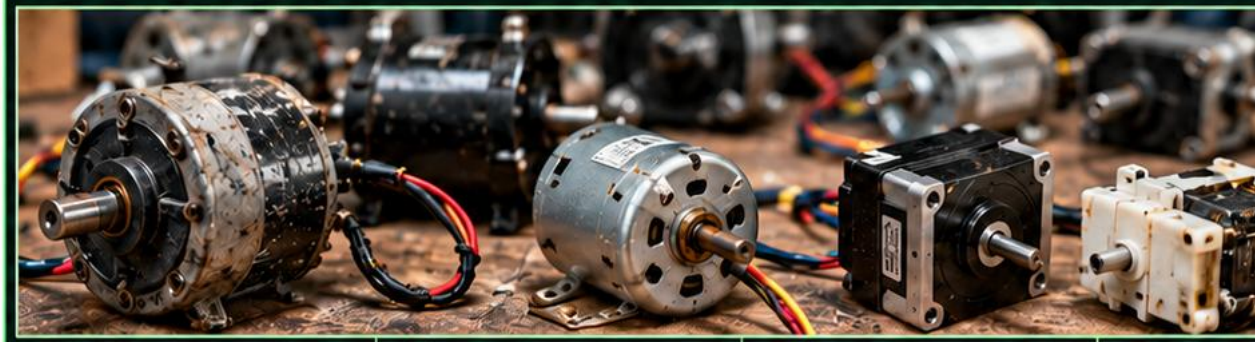
PREPARE
ADAPT
SURVIVE

C08 UNKNOWN MOTOR = STOP

IF TYPE/OUTPUT CANNOT BE SAFELY ESTABLISHED, DO NOT CONNECT A LOAD.

UNKNOWN MOTOR = STOP; IF TYPE/OUTPUT CANNOT BE SAFELY ESTABLISHED, DO NOT CONNECT A LOAD.

GREEN
LOW RISK
BASIC KNOWLEDGE



WHEN TO STOP

If you cannot safely establish the motor type, voltage, current, control method or expected output, do not connect a load. Unknown motors may behave differently and can be damaged or create safety risks. Gather more information or seek professional advice before proceeding.

If uncertain, stop and do not connect a load.

1 IDENTIFY WHAT YOU KNOW



- Check for labels, markings or model numbers.
- Note the number of wires and connectors.
- Look for clues: shape, size, mounting style, gearbox, magnets, etc.

2 LOOK FOR MULTIPLE CLUES



- Use multiple features together: appearance, wiring, magnets, construction and size.
- Do not rely on a single clue such as wire count.
- Consider application and similar examples.

3 CHECK INFORMATION



- Search datasheets, manufacturer information or similar models.
- Compare with known examples and specifications.
- If still uncertain, treat as unknown.

4 DO NOT CONNECT A LOAD



- Do not connect a load, blade, pump or generator.
- Do not connect to a power source to "see what happens".
- Unknown motors may overheat, draw high current or behave unexpectedly.

5 SEEK HELP IF NEEDED



- If you cannot confidently identify the motor and its safe operating conditions, seek professional advice.
- Provide clear photos, wiring information and any markings or measurements.

COMMON MISTAKES

THESE CAN CAUSE DAMAGE, OVERHEATING, FIRE OR INJURY.



Connecting a load without identification.



Connecting directly to a battery or power supply.



Ignoring wiring and control requirements.



Testing without knowing the voltage or current limits.

KEY MESSAGES

- If the motor type/output cannot be safely established, do not connect a load.
- Use multiple features for identification.
- Do not rely on wire count alone.
- Only test with safe methods and appropriate limits.
- Unknown motors can behave differently and may be damaged.
- Seek professional advice if uncertain.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

D01

BICYCLE GENERATION — STABILISE THE FRAME FIRST

STABLE SUPPORT AND ROTATING-PART SEPARATION.

SET UP THE BICYCLE SECURELY BEFORE GENERATION TO ENSURE SAFETY, STABILITY AND RELIABILITY.

GREEN
LOW RISK
BASIC KNOWLEDGE



STABILISE THE FRAME

A stable bicycle frame and secure mounting are essential for safe and efficient power generation. Ensure the bicycle is firmly fixed, does not move during use, and the rotating parts are properly separated and guarded. A stable setup helps maintain smooth operation and reduces the risk of injury, equipment damage or poor power output.

1 CHOOSE A SUITABLE BICYCLE



- Use a sturdy bicycle in good condition.
- Check the frame, wheels, brakes and drivetrain.
- Avoid damaged or excessively worn parts.
- A multi-gear bicycle works best.

2 SECURE THE FRAME



- Use a solid stand, rack or fixed mount to hold the bicycle securely.
- Ensure the frame does not move or wobble.
- Place on a firm, level surface.
- Check stability before use.

3 SET UP THE GENERATOR



- Use a suitable generator (e.g. PMDC motor).
- Ensure good contact between the wheel/roller and generator.
- Align properly and maintain consistent pressure.
- Check for smooth rotation.

4 SEPARATE ROTATING PARTS



- Keep rotating parts such as chain, sprocket and belt guarded.
- Use covers or barriers to prevent accidental contact.
- Keep clothing, hands and loose items away.
- Ensure safe distance for bystanders, especially children.

5 READY FOR GENERATION



- Confirm the setup is stable and all parts are secure.
- Check there is no unusual noise or vibration.
- Ensure rotating parts are guarded.
- Proceed to the next card (D02 – Gearing) for power generation operation.

COMMON MISTAKES

THESE CAN LEAD TO INJURY, EQUIPMENT DAMAGE OR POOR POWER OUTPUT.



Frame not fixed, unstable setup.



Loose stand or improper mounting.



No guard on rotating parts.



Poor alignment or insufficient contact.



Loose clothing or items near rotating parts.

KEY MESSAGES

- Stabilise the bicycle frame before generation.
- Use a suitable generator and ensure proper contact.
- Separate and guard all rotating parts.
- Keep hands, clothing and bystanders away.
- Check for stability, noise and smooth operation.
- A stable setup improves safety, reliability and power output.
- Proceed to D02 – Gearing for the next step.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

D02

GEARING — SMOOTH MECHANICS, NOT MAGIC NUMBERS

ADJUST PROGRESSIVELY; NO UNIVERSAL RPM RULE.

Use appropriate gears for terrain and conditions. Focus on smooth, reliable and efficient operation.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



UNDERSTAND GEARING

Gears allow you to match pedaling effort to the terrain, speed and load. There is no universal RPM rule — what works best depends on the rider, bicycle, terrain and conditions. Use gears progressively to keep a smooth pedaling rhythm, reduce strain on the drivetrain, and improve efficiency and control.

Adjust progressively; no universal RPM rule.

1 UNDERSTAND THE TERRAIN



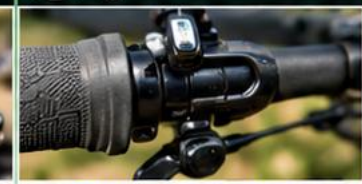
- Choose gears suitable for the terrain (e.g. hills, flat, rough tracks).
- Use lower gears for climbs and higher gears for descents or cruising.
- Anticipate changes and shift early.

2 CHECK THE DRIVETRAIN



- Check chain, cassette and chainrings for wear or damage.
- Ensure smooth movement and proper alignment.
- Keep the drivetrain clean and well lubricated.
- Fix issues before riding.

3 SHIFT GRADUALLY



- Shift one gear at a time and pedal smoothly.
- Avoid sudden or forceful shifting.
- Keep a steady pedaling rhythm.
- Listen for unusual noises or rough operation.

4 AVOID EXTREME GEARS



- Avoid cross-chaining (largest chainring with largest sprocket, or smallest with smallest).
- Do not stay in extreme gears for long periods.
- This reduces wear and helps maintain smooth operation.

5 OBSERVE AND ADJUST



- Observe how the bicycle responds.
- Adjust gears as needed for comfort and efficiency.
- If shifting feels rough or there are unusual noises, stop and inspect.
- Seek professional help if problems persist.

COMMON MISTAKES

THESE CAN LEAD TO POOR PERFORMANCE, FASTER WEAR OR INJURY.



Using extreme gear combinations.



Ignoring wear or lack of maintenance.



Shifting too quickly or forcefully.



Riding with a dirty or dry chain.



Ignoring unusual noises or rough shifting.

KEY MESSAGES

- Use appropriate gears for the terrain and conditions.
- Adjust progressively; no universal RPM rule.
- Keep the drivetrain clean, lubricated and in good condition.
- Avoid cross-chaining and extreme gears.
- Shift smoothly and listen for unusual noises.
- Check and fix issues before riding.
- Proper gearing improves comfort, efficiency and safety.
- Seek professional advice if needed.

D03

HUMAN POWER — SUSTAINABLE EFFORT FIRST

AVOID EXHAUSTION; DO NOT CLAIM FIXED WATTAGE.

Use human power at a comfortable and sustainable level for safety and long-term use.

GREEN
LOW RISK
BASIC KNOWLEDGE



PACE YOURSELF

Human power is clean, reliable and sustainable when used at a comfortable level. Avoid exhaustion and do not claim a fixed wattage, as output varies widely between people and conditions. Use an appropriate gear, maintain a steady pace, take regular breaks and stay hydrated. Sustainable effort helps you ride further, stay safe and enjoy the experience.

Avoid exhaustion; do not claim fixed wattage.

1 UNDERSTAND YOUR LIMITS



- Know your fitness level and experience.
- Start at a comfortable pace.
- Avoid overexertion.
- Adjust the ride to the terrain, temperature and load.

2 USE APPROPRIATE GEARS



- Use a gear that matches the terrain and your ability.
- Keep a steady and efficient cadence.
- Avoid constantly riding in too high or too low a gear.
- Shift early before it becomes difficult.

3 STAY HYDRATED



- Drink water regularly, especially in hot conditions.
- Do not wait until you feel thirsty.
- Consider electrolytes during long rides.
- Stay hydrated to maintain performance and safety.

4 TAKE REGULAR BREAKS



- Take short, regular breaks to rest and recover.
- Relax your muscles and check your equipment.
- Use breaks to eat, drink and assess your condition.
- Stop if you feel tired, dizzy or unwell.

5 KEEP EQUIPMENT IN GOOD CONDITION



- Check chain, gears, pedals and brakes regularly.
- Keep the drivetrain clean and lubricated.
- Fix wear or damage before riding.
- Well-maintained equipment makes riding easier and safer.

COMMON MISTAKES THESE CAN LEAD TO FATIGUE, INJURY OR A POOR RIDING EXPERIENCE.



Riding too hard too soon.



Using the wrong gear for the terrain.



Not drinking enough water.



Skipping breaks and ignoring fatigue.



Riding with poor maintenance.

KEY MESSAGES

- Use human power at a comfortable and sustainable level.
- Avoid exhaustion; do not claim a fixed wattage.
- Use appropriate gears and maintain a steady cadence.
- Stay hydrated and take regular breaks.
- Keep equipment in good condition.
- Listen to your body and stop if you feel unwell.
- Sustainable effort improves safety, health and enjoyment.
- Seek professional advice if needed.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

D04 HUMAN POWER ENTERS THE SAFE CHARGING CHAIN

GENERATION PROCEEDS TO CH SECTION; NEVER DIRECTLY TO STORAGE.

Route bicycle power through a charge controller and the correct charging chain.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



USE A SAFE CHARGING CHAIN

Human power generation must enter the CH section through a suitable charge controller. Do not connect the generator directly to a battery or storage device. The charge controller regulates voltage and current, matches the battery type and protects both the generator and the storage system. This keeps the system safe and reliable, and prevents damage.

Generation proceeds to CH section; never directly to storage.

1 ROUTE TO CONTROLLER



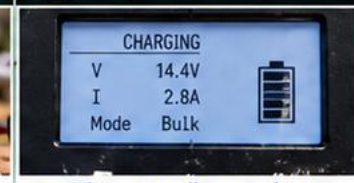
- Connect the bicycle generator to a charge controller input.
- Use the correct cable size and connectors.
- Ensure secure, weather-resistant connections.
- Do not bypass the controller.

2 USE A COMPATIBLE CHARGE CONTROLLER



- Use a controller suitable for human power / low-speed generation (e.g. MPPT).
- Ensure it supports your battery type (e.g. 12V).
- Follow manufacturer wiring and settings.
- Protect the controller from moisture and impacts.

3 REGULATE AND MATCH



- The controller regulates the generator output.
- It matches voltage and current to the battery type and charging stage.
- It prevents overcharge, reverse current and unsafe voltage.

4 PROTECT THE SYSTEM



- Prevent excessive voltage and current from the generator.
- Protect both the generator and the storage device.
- Reduce the risk of overheating, battery damage or equipment failure.

5 THEN TO STORAGE



- After regulation, the controller safely charges the battery or storage device.
- Check the battery type, voltage and charge settings.
- Monitor temperature and system behaviour.
- Keep the charging area dry, ventilated and protected.

COMMON MISTAKES

THESE CAN DAMAGE EQUIPMENT, REDUCE PERFORMANCE OR CREATE SAFETY RISKS.



Connecting the generator directly to a battery.



Using the wrong controller or no controller.



Undersized or poor quality wiring.



Exposing the controller to rain or moisture.



Wrong battery type or charge settings.

KEY MESSAGES

- Route human power generation through a charge controller.
- Do not connect directly to a battery or storage device.
- Use a controller suitable for low-speed / human power.
- Match the controller to the correct battery type and settings.
- Keep wiring secure, dry and properly protected.
- The controller regulates and protects the system.
- A safe charging chain prevents damage and improves reliability.
- Generation proceeds to CH section; never directly to storage.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

E01 CHOOSE THE WATER SITE – ESCAPE & FLOOD FIRST

FLASH FLOOD, SLIPS AND DROWNING RISK COME BEFORE POWER GENERATION.

Pick a safe, stable and accessible site before looking at equipment or output.

GREEN
LOW RISK
BASIC KNOWLEDGE



SAFETY COMES FIRST

The site must be safe from flash floods, landslides and unstable ground. A good micro-hydro site has reliable flow, natural head and stable banks, and is accessible for maintenance in most weather conditions. Do not choose a site that could be dangerous during heavy rain, snow melt or storms.

Avoid flood risk and unstable terrain before considering power output.

1 FIND FLOW AND HEAD



- Look for a reliable flow all year round.
- Find natural height difference (head), such as a small waterfall or steep drop.
- More head usually gives better power potential.
- A stable, consistent flow is more important than maximum flow.

2 CHECK FLOOD RISK



- Look for signs of high flood levels: debris lines, damaged trees, scoured rocks.
- Stay well above the likely flood level.
- Do not build in the path of flash floods or debris.
- Avoid narrow gorges or valleys where water can rise quickly.

3 AVOID UNSTABLE SLOPES



- Check for loose rocks, landslide scars or unstable soil.
- Avoid steep, recently moved or water-logged slopes.
- Do not work under cliffs or large overhangs.
- Choose solid ground with good natural drainage.

4 ACCESS FOR MAINTENANCE



- Ensure safe and practical access for regular inspection, cleaning and repairs.
- Allow safe walking routes with reasonable slope.
- Consider how to transport tools and materials.
- Avoid sites that are only accessible in dry weather if you need year-round use.

5 MINIMISE ENVIRONMENTAL IMPACT



- Use existing natural features where possible.
- Avoid unnecessary damage to river banks, trees and habitat.
- Keep the water as clean as possible.
- Follow local rules and respect cultural and environmental values.

COMMON MISTAKES

THESE CAN LEAD TO INJURY, EQUIPMENT LOSS OR ENVIRONMENTAL DAMAGE.



Building in a flood-prone area.



Choosing unstable or loose ground.



Working in a narrow gorge with flash flood risk.



No safe access for maintenance.



Unnecessary environmental damage.

KEY MESSAGES

- Choose a safe, stable and reliable water site first.
- Check for flood risk, landslides and unstable ground.
- Find good flow and natural head.
- Ensure practical access for maintenance.
- Minimise environmental impact.
- Do not risk your safety for higher power output.
- When in doubt, choose a safer alternative site or seek professional advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

E02

NO-METER WATER ASSESSMENT — CONTINUITY, NOT WATTS

JUDGE WHETHER THE SITE IS USABLE: DO NOT INVENT EXACT POWER.

Check flow, head, stability and risks using simple, safe methods.

GREEN
LOW RISK
BASIC KNOWLEDGE



ASSESS SAFELY AND PRACTICALLY

You do not need exact power numbers to decide if a micro-hydro site may be usable. Look for a reasonably consistent flow, a clear height drop (head), stable banks and manageable risks. Use simple visual checks and local knowledge. If the flow is seasonal, unstable, blocked by debris, or the site is unsafe to access, do not proceed. Choose another site or seek advice.

Judge whether the site is usable; do not invent exact power.

1 CHECK CONTINUOUS FLOW



- Look for water flowing all year if possible.
- Visit at different times of day and in different weather conditions.
- Look for a steady, consistent flow rather than short bursts.
- Avoid sites that may dry up often or completely.

2 ESTIMATE HEAD VISUALLY



- Look for a clear height drop between the water intake and the turbine location.
- Use simple visual comparison (e.g. person height, rock size, nearby objects).
- A bigger, reliable drop usually gives more
- potential, but safety and stability matter more.

3 CHECK SITE STABILITY



- Look for stable ground and solid rock where possible.
- Avoid loose rocks, recent landslides, eroding soil or undercut banks.
- Check for fallen trees, debris or signs of recent flooding.
- Make sure the site is likely to remain stable in heavy rain.

4 LOOK FOR RISKS



- Identify debris risk (leaves, branches, logs, sediment).
- Consider how easily an intake could be blocked.
- Check for signs of erosion, landslides or changing river course.
- Avoid sites with overhanging trees that could fall.
- Stay well away from unstable banks and flood zones.

5 CHECK ACCESS AND ENVIRONMENT



- Ensure safe access for inspection, maintenance and emergency work.
- Avoid steep, slippery or hazardous routes.
- Consider the impact on the local environment and habitat.
- Follow local rules and respect cultural values and protected areas.

COMMON MISTAKES

THESE CAN LEAD TO POOR PERFORMANCE, DAMAGE OR SERIOUS INJURY.



Assuming the flow is enough without checking in different conditions.



Overestimating the height drop (head).



Choosing unstable ground or recent landslide areas.



Ignoring debris risk and blocked intake potential.



Using unsafe access routes or working in flood-prone areas.

KEY MESSAGES

- Check for continuous flow and reasonable head.
- Use simple visual methods: do not invent exact power.
- Look for stable ground and manageable risks.
- Identify and plan for debris, erosion and flooding.
- Ensure safe access for inspection and maintenance.
- Avoid sites that depend on short-term conditions only.
- Respect the environment and local rules.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

E03

SEPARATE WATER WHEEL & GENERATOR — MECHANICAL AND WATER RISKS

SPLASH, MOVING PARTS AND WATER IN ELECTRICAL EQUIPMENT ARE DANGEROUS.
Assess, separate and protect both the mechanical and electrical parts.

AMBER
MEDIUM RISK
INCREASE AWARENESS
REQUIRED



KEEP WATER AND ELECTRICITY SEPARATE

A micro-hydro system has a mechanical section (water wheel, shaft, pulleys and belts) and an electrical section (generator and wiring), Keep them separate. Prevent water spray from reaching the generator or electrical connections. Use covers, shelters and proper mounting. This reduces the risk of electric shock, short circuits, corrosion and mechanical injury, and keeps the system reliable.

Separate the mechanical and electrical parts and keep water away from the generator.

1 IDENTIFY MECHANICAL PARTS



- Find the water wheel, shaft, pulleys, belts and bearings.
- Check for damaged, loose or worn parts.
- Look for sharp edges, pinch points and moving parts.
- Keep hands, clothing and tools clear while operating.

2 PROTECT THE GENERATOR



- Keep the generator in a dry, sheltered and elevated location.
- Prevent water spray, rain and ground water from reaching the generator.
- Use a cover or enclosure with ventilation.
- Keep connections off the ground and protected.

3 CHECK DRIVE SYSTEM



- Inspect belts, pulleys, couplings and shaft.
- Make sure guards are in place where possible.
- Check alignment and tension.
- Listen for unusual noise or vibration.
- Repair or replace worn parts before use.

4 CONTROL WATER SPRAY



- Use baffles, splash guards or simple screens to block direct spray.
- Manage the flow so water stays in the channel or chute.
- Avoid designs that throw water towards the generator.
- Keep the area around the generator dry and well drained.

5 MAINTAIN SAFE DISTANCE



- Keep a clear physical separation between the water wheel and generator.
- Avoid mounting the generator where it can be hit by spray or flooding.
- Ensure the location is stable and accessible for maintenance.
- Consider future high water levels and seasonal changes.

COMMON MISTAKES

THESE CAN LEAD TO ELECTRIC SHOCK, EQUIPMENT DAMAGE OR INJURY.


Generator in direct water spray.


Generator mounted on wet ground.


Missing belt guards.


Water splashing towards generator.


Generator too close to water wheel.

KEY MESSAGES

- Keep mechanical and electrical parts separate.
- Prevent water spray, rain and ground water from reaching the generator.
- Inspect and maintain the drive system.
- Use guards, covers and proper mounting.
- Keep the area dry and well drained.
- Maintain a safe distance and consider high water levels.
- Regular maintenance keeps the system safe and reliable.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

E04

MECHANICAL OBSERVATION — CHECK BEFORE LOAD

INSPECT THE WATER WHEEL, SHAFT, BEARINGS AND MOVING PARTS.
Find problems before you connect a generator or any electrical load.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



INSPECT AND CONFIRM SAFE OPERATION

Before connecting any electrical load, check the water wheel, shaft, bearings, couplings, belts, pulleys and guards. Look for worn, loose, cracked or misaligned parts. Fix problems first to prevent injury, equipment damage or sudden loss of power. Make sure everything is secure, runs smoothly and is free from excessive noise, vibration or unusual movement.

Check mechanical condition before load; fix problems first.

1 CHECK WHEEL CONDITION



- Inspect paddles for cracks, rot, loose boards or missing parts.
- Check for debris caught in the wheel.
- Make sure the wheel is secure on its shaft.
- Remove any objects that could damage the wheel or block its movement.

2 CHECK BEARINGS



- Look for signs of wear, leaks or damage.
- Check that bearings are securely mounted.
- Ensure they run smoothly without roughness, excessive noise or heat.
- Lubricate if required and re-check after a short test run.

3 CHECK BELTS AND COUPLINGS



- Inspect belts for cracks, fraying or damage.
- Check belt tension — not too loose, not too tight.
- Make sure couplings are secure and undamaged.
- Check alignment between wheel, shaft and generator.
- Replace worn or damaged belts or couplings.

4 CHECK SHAFT AND FASTENINGS



- Check the shaft for damage, bending or excessive play.
- Ensure all bolts, brackets and mounts are tight.
- Look for signs of vibration or misalignment.
- Confirm guards and covers are in place and secure.
- Tighten or repair before connecting any load.

5 TEST RUN UNLOADED



- Run the system without electrical load first.
- Listen for unusual noise, vibration or movement.
- Check for water leaks or spray reaching electrical parts.
- Confirm smooth, stable operation before connecting a generator or any load.

COMMON MISTAKES

THESE CAN LEAD TO INJURY, EQUIPMENT DAMAGE OR LOSS OF POWER.



Ignoring cracked or damaged paddles.



Running with worn or noisy bearings.



Using damaged or loose belts.



Loose mounting bolts or brackets.



Missing guards or covers.

KEY MESSAGES

- Inspect the water wheel, shaft, bearings, belts and couplings before load.
- Look for wear, damage, loose parts and misalignment.
- Ensure smooth, stable and quiet operation.
- Keep guards and covers in place.
- Run the system without load first.
- Fix any problems before connecting a generator or electrical load.

E05

TEST WITH A KNOWN SMALL LOAD – CHECK BASIC FUNCTION

JUDGE TASK STABILITY, NOT EXACT WATTAGE OR FIXED DURATION.

Use a simple, known low-power device to check if the power system works reliably.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



USE A KNOWN, LOW-POWER LOAD

Connect a simple, low-power device with a known function, such as an LED light, phone charger or USB fan, to check whether the system can supply power stably. This is not to measure exact wattage or runtime. You are checking that the output works, the device runs normally, and there are no obvious problems such as tripping, overheating or unstable operation.

Judge task stability, not exact wattage or fixed duration.

1 CHOOSE A SIMPLE LOAD



- Use a known, low-power device (e.g. LED light, phone charger, small USB fan, radio).
- Make sure the device works normally on other power sources.
- Avoid high-power or critical devices (heaters, kettles, tools) for this test.

2 CONNECT AND POWER ON



- Connect the device to the generator, power station or inverter.
- Switch on the device.
- Check that the device starts normally and keeps running.
- Watch for error messages, warning lights or automatic shutdown.

3 OBSERVE FOR A SHORT TIME



- Let it run for several minutes.
- Check that the device keeps working normally without flickering, shutting down or reset.
- Listen for unusual noise and feel for excessive heat on the device and power system.

4 CHECK STABILITY



- Look for stable operation (no repeated on/off).
- Check that the fan/light/charger runs smoothly.
- If possible, try a second small device (e.g. phone + light) to see if basic load sharing works.
- You do not need to measure exact wattage or runtime.

5 JUDGE RESULT



- If the device runs normally and stays stable, the basic power function is OK.
- If the device does not start, stops repeatedly, or shows error/overheat signs, do not use the system for important loads.
- Fix the problem or seek advice before connecting other devices.

COMMON MISTAKES

THESE CAN LEAD TO UNRELIABLE OPERATION, EQUIPMENT DAMAGE OR LOSS OF POWER.



Using high-power devices for the test.



Using an unkoown or damaged device.



Connecting too many devices at once.



Ignoring warning lights or overheating.



Assuming it is fine even if the device turns on and off repeatedly.

KEY MESSAGES

- Use a simple, known low-power device for testing.
- Check that the device starts and runs normally.
- Observe for a few minutes and look for stable operation.
- Listen for unusual noise and feel for excessive heat.
- Do not rely on this test for exact wattage or runtime.
- If there are any problems, fix them before connecting important devices.
- This test helps you judge basic function and stability, not exact power output.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

E06

RISING / DIRTY WATER OR MOVING SUPPORT — ENVIRONMENTAL SAFETY FIRST

IF WATER IS RISING, MUDDY OR MOVING, STOP AND MOVE TO HIGHER GROUND.

Environmental STOP overrides saving equipment.

GREEN
LOW RISK
GOOD PRACTICE
KEEP AWARE



PRIORITISE ENVIRONMENTAL SAFETY

Check for signs of rising water, heavy rain, mud, flood risk or unstable, moving ground (e.g. landslides or riverbank erosion) before and during operation. If water is rising, dirty or moving, stop using the system immediately and move equipment to higher, safer ground. Do not try to save equipment at the risk of personal safety.

Environmental STOP overrides saving equipment.

1 CHECK WEATHER AND WATER



- Check the weather forecast for heavy rain, storms or rising river levels.
- Look for signs of rising or fast-moving water.
- Be alert to muddy water, which can indicate high flow and hidden hazards.
- If in doubt, choose a safer location.

2 LOOK FOR GROUND RISKS



- Check for soft, muddy or unstable ground.
- Look for signs of landslide risk, erosion or washed-out areas.
- Avoid setting up on riverbanks, floodplains or areas that may be flooded.
- Make sure the ground can safely support your equipment and people.

3 MOVE TO HIGHER GROUND



- If water is rising or there is any flood risk, stop operation and move equipment to higher, safer ground.
- Keep enough distance from rivers, streams and drainage channels.
- Choose a stable, dry area outside the expected water level.
- Do not wait until water reaches the equipment.

4 DO NOT RISK EQUIPMENT



- Do not try to save equipment if the water is rising or moving quickly.
- Turn off the system and disconnect if it is safe to do so.
- Move people to safety first.
- Equipment can be replaced; your safety cannot.

5 KEEP WATCH AND REVIEW



- Keep monitoring weather and water conditions.
- Look for changes upstream that may affect your location (such as heavy rain).
- Be ready to leave early if conditions worsen.
- Choose a different location if the area becomes unsafe.

COMMON MISTAKES

THESE CAN LEAD TO DANGEROUS SITUATIONS, INJURY OR LOSS OF EQUIPMENT.



Setting up too close to the water.



Using soft or muddy ground.



Leaving equipment when water is rising.



Crossing or working near fast-moving water.



Ignoring weather warnings or heavy rain.

KEY MESSAGES

- Check for rising, dirty or moving water before and during operation.
- If water is rising or there is flood risk, stop and move to higher ground.
- Do not try to save equipment at the risk of personal safety.
- Avoid unstable, muddy or eroded ground.
- Keep monitoring weather and water conditions.
- Environmental STOP overrides saving equipment.
- Your safety comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

F01

WIND SITE — MARK THE FALL / ROTOR DANGER ZONE

KEEP PEOPLE OUTSIDE ROTOR PLANE AND FALL ZONE.
Rotating blades and falling parts can cause serious injury or death.

GREEN
LOW RISK
GOOD PRACTICE
KEEP AWARE



ESTABLISH AND RESPECT THE DANGER ZONE

Keep everyone outside the rotor plane and fall zone at all times. Blades, ice throw or other parts can fall or be thrown a long distance. The danger zone extends beyond the tower and includes the area the blades sweep. Mark and sign the area clearly, especially during installation, maintenance or high wind. Only trained and authorised people should enter the controlled area when the turbine is stopped and made safe.

Keep people outside rotor plane and fall zone.

1 IDENTIFY THE DANGER ZONE



- The danger zone includes the area the blades sweep (rotor plane) and the surrounding fall zone.
- Allow extra distance for turbulence, ice throw or unexpected failures.
- Check site conditions and local guidance for safe distances.

2 MARK AND RESTRICT ACCESS



- Use fencing, tape, signs or natural barriers to mark the danger zone.
- Make the area clearly visible from all approach routes.
- Keep unauthorised people, vehicles and animals out.
- Maintain markers and signs in good condition.

3 KEEP PEOPLE INFORMED



- Brief all workers and visitors about the danger zone.
- Explain the risks from rotating blades and falling parts.
- Make sure everyone understands and respects the exclusion area.
- Use clear signage and verbal reminders on site.

4 CONSIDER CHANGING CONDITIONS



- Strong winds, turbulence or storm conditions can increase the risk area.
- Consider ice throw, loose parts or other debris.
- Re-check the danger zone after severe weather.
- If conditions are uncertain, increase the exclusion distance.

5 ONLY ENTER WHEN SAFE



- Only enter the danger zone when the turbine is stopped and made safe.
- Follow lockout/tagout procedures.
- Ensure blades are fully stopped and secured before entering.
- Keep people outside the area during maintenance.

COMMON MISTAKES — THESE CAN LEAD TO SERIOUS INJURY OR DEATH.



Walking or working too close to the turbine.



No signs or fencing to mark the danger zone.



Allowing people in the area while the turbine is running.



Standing under the blades.



Parking vehicles or equipment inside the danger zone.

KEY MESSAGES

- Keep everyone outside the rotor plane and fall zone.
- Mark and sign the danger zone clearly.
- Consider weather, ice throw and other risks.
- Only authorised and trained people may enter when the turbine is stopped and made safe.
- Maintain barriers and signs.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

F02

TOWER / GUYS / ANCHORS — MECHANICS FIRST

STRUCTURAL STABILITY BEFORE GENERATION.

A damaged, loose or unstable tower can fail and cause serious injury or death.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

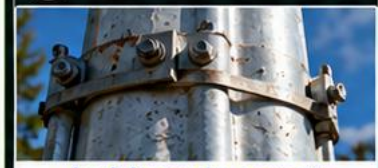


CHECK STRUCTURAL STABILITY FIRST

Before operating or generating power, check the **tower**, guys (guy wires) and anchors for damage, corrosion, looseness or movement. Make sure all bolts, clamps, bases and foundations are secure and in good condition. Do not operate the turbine if the structure is damaged, unstable or uncertain. Repairs and maintenance should be carried out by trained and competent people.

Structural stability before generation.

1 INSPECT THE TOWER



- Look for cracks, corrosion, bending or other damage on the tower.
- Check all bolts, clamps and connections.
- Make sure the tower is upright and stable.
- Look for signs of wear, fatigue or loose parts.
- Do not use if damaged or unstable.

2 CHECK GUY WIRES



- Check all guy wires (guys) for correct tension, wear, corrosion or fraying.
- Make sure tensioners and clamps are secure.
- Look for damaged, loose or missing guy wires.
- Ensure guys are properly anchored and clear of obstructions.
- Do not operate if any guy wire is damaged.

3 CHECK ANCHORS



- Check that all anchors are secure and not moving.
- Look for signs of ground erosion, loose soil or washout around anchors.
- Ensure anchor type is suitable for site conditions.
- Repair or reinforce loose or damaged anchors.
- Do not operate if anchors are unstable.

4 CHECK SUPPORT STRUCTURE



- Check the base, foundation or mounting structure.
- Look for cracks, movement or settling.
- Make sure all fixings are tight and corrosion-free.
- Check that nearby soil is stable and not eroding.
- Do not operate if the base or support structure is damaged or unstable.

5 CONFIRM SAFE TO OPERATE



- After inspection, confirm the tower, guys and anchors are in good condition.
- If there is any doubt about structural stability, do not operate the turbine.
- Contact a trained and competent person for assessment or repair.
- Safety comes first — structural stability before generation.

COMMON MISTAKES

THESE CAN LEAD TO TOWER FAILURE, SERIOUS INJURY OR DEATH.



Ignoring rust, cracks or damage.



Loose or damaged guy wires.



Weak or eroded anchors.



Operating with an unstable foundation.



Continuing to operate despite visible damage.

KEY MESSAGES

- Inspect tower, guys and anchors before operation.
- Look for damage, corrosion, looseness or movement.
- Ensure all bolts, clamps and foundations are secure.
- Do not operate if the structure is damaged or unstable.
- Carry out repairs by trained and competent people.
- Structural stability before generation.
- Your safety and the safety of others comes first.

F03

BLADES & HUB — CRACKED MEANS DISCARD

DO NOT FIELD-REPAIR CRACKED HIGH-SPEED BLADES

Do not field-repair cracked high-speed blades for continued use.
Hidden cracks can grow quickly and cause sudden failure, serious injury or death.

GREEN
LOW RISK
GOOD PRACTICE
KEEP AWARE



INSPECT REGULARLY AND RECOGNISE DAMAGE

Check blades, hub and connections regularly for cracks, delamination, loose parts, missing material or unusual noises. If a blade is cracked or seriously damaged, do not field-repair it for continued use. Remove the turbine from service and replace the blade or the entire rotor as appropriate. Use only manufacturer-approved parts and methods.

Do not field-repair cracked high-speed blades for continued use.

1 INSPECT BLADES



- Look for cracks, chips, delamination or missing material.
- Check both sides and blade edges.
- Inspect after strong winds, impacts or unusual noise.
- Do not ignore small cracks — they can quickly grow.

2 CHECK HUB AND BOLTS



- Check the hub for cracks, deformation or unusual movement.
- Ensure all bolts, clamps and connections are tight and not damaged.
- Look for signs of wear, corrosion or loose parts.
- Keep the area clean.

3 DO NOT FIELD-REPAIR



- Do not use tape, glue, resin or makeshift repairs on cracked blades.
- Do not try to balance or modify blades yourself.
- A repaired blade can fail suddenly at high speed.
- Remove the turbine from service if any blade is cracked or seriously damaged.

4 REPLACE OR DISCARD



- Use manufacturer-approved replacement blades and parts.
- If the blade is cracked or structurally damaged, replace the blade or entire rotor as recommended.
- Do not use damaged blades for continued operation.
- Follow manufacturer guidance for replacement.

5 TEST AFTER MAINTENANCE



- After replacement or maintenance, check that all parts are installed correctly.
- Look for unusual vibration or noise during initial test.
- Keep people outside the danger zone during testing.
- If there is any concern, stop the turbine and re-check.

COMMON MISTAKES

THESE CAN LEAD TO SUDDEN BLADE FAILURE, SERIOUS INJURY OR DEATH.



Using tape or glue to repair a cracked blade.



Continuing to use a damaged blade.



Ignoring loose or corroded bolts.



Attempting homemade repairs or modifications.



Using non-approved or second-hand damaged blades.

KEY MESSAGES

- Inspect blades, hub and connections regularly.
- Do not field-repair cracked high-speed blades.
- Remove from service and replace if damaged.
- Use manufacturer-approved parts and methods.
- Check for unusual vibration or noise.
- Keep people outside the danger zone.
- Structural integrity is critical — cracks can fail fast.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

F04

WIND OUTPUT ENTERS A MATCHED CONTROL CHAIN
NO DIRECT PHONE / BATTERY CONNECTION

Wind turbine output must go through a compatible controller.
Do not connect directly to phones, batteries or other devices.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



USE A COMPATIBLE CONTROLLER

Wind turbine output is variable and can be high voltage AC. It must go through a controller/rectifier designed for wind power, which manages charging, protects batteries and devices, and provides brake or dump load when needed. Do not connect directly to phones, batteries, power stations or other devices. Only use a controller that explicitly supports wind turbines.

No direct phone/battery connection; controller must explicitly support wind.

1 USE THE RIGHT CONTROLLER



- Use a wind turbine controller rated for your turbine and system.
- Controller should include rectifier, charge control and over-speed protection (brake or dump load).
- Follow manufacturer specifications and wiring diagram.

2 DO NOT CONNECT DIRECTLY



- Do not connect the turbine directly to a phone, battery, power station or other device.
- Wind output can be high voltage AC and unstable.
- Direct connection can damage devices, cause fire or serious injury.

3 CHECK WIRING AND PROTECTION



- Check all wiring, fuses, breakers and surge protection.
- Use correct wire size and enclosures suitable for outdoor conditions.
- Keep connections dry, secure and away from water.
- Make sure earthing/grounding is installed as required.

4 MONITOR AND LIMIT OUTPUT



- Check controller display or indicators regularly.
- Make sure charging voltage and current are within safe limits for your battery system.
- Ensure over-speed protection (brake or dump load) is working.
- Stop and investigate if readings are abnormal.

5 MAINTAIN AND TEST



- Inspect controller, wiring and connections regularly for wear, corrosion or loose parts.
- Keep the controller clean and dry.
- Test safety functions (brake or dump load) according to manufacturer instructions.
- Replace damaged or faulty components.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, EQUIPMENT DAMAGE, SERIOUS INJURY OR DEATH.



Connecting directly to a phone or powerbank.



Connecting directly to a battery.



Using an inverter without a proper controller.



Poor or exposed wiring in wet conditions.



No dump load or brake protection.

KEY MESSAGES

- Use a compatible wind turbine controller.
- Do not connect directly to phones, batteries or devices.
- Ensure correct wiring, fuses and protection.
- Monitor output and keep within safe limits.
- Make sure over-speed protection (brake or dump load) is working.
- Inspect and maintain the system regularly.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

F05

SHUT DOWN BEFORE WEATHER DETERIORATES

USE OEM / PREPLANNED SAFE SHUTDOWN METHOD EARLY.

Strong winds, storm, lightning, icing or extreme weather can cause turbine failure, fire or serious injury. Shut down early, following the OEM method.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED



SHUT DOWN EARLY AND SAFELY

Monitor weather forecasts and local conditions (wind speed, approaching storm, lightning, icing, extreme gusts). Shut down the turbine early, before conditions deteriorate. Use the manufacturer's recommended shutdown method or your preplanned safe procedure. Do not wait until the turbine is already in strong winds to shut down. After shutdown, secure the system and check the area for loose parts.

Use OEM / preplanned safe shutdown method early.

1 MONITOR WEATHER EARLY



- Check weather forecast regularly (wind, storm, lightning, icing).
- Monitor local conditions and any warnings.
- Know your site's safe limits and shutdown thresholds.
- Plan ahead and do not wait until conditions are already dangerous.

2 USE OEM SHUTDOWN METHOD



- Follow the manufacturer's shutdown procedure.
- Use the correct controller or braking method.
- Allow the turbine to slow down and stop safely.
- Confirm the system is off before leaving the site.

3 ISOLATE AND SECURE



- Isolate the system from power sources (rectifier, battery, grid or backup).
- Apply lockout/tagout if available.
- Secure the controller and electrical enclosure.
- Make sure the turbine cannot restart unexpectedly.

4 CHECK AND SECURE SITE



- Check guy wires, anchors, bolts and tower parts.
- Look for loose items that could be blown away.
- Secure or remove loose accessories (cables, tools, panels, etc.).
- Keep the area clear of people, vehicles and animals.

5 RECHECK AFTER THE WEATHER



- Do not restart until conditions are safe.
- Inspect the turbine and site for any damage.
- Check all mechanical and electrical components.
- Follow the OEM restart procedure.
- If any damage is found, contact a trained person for assessment and repair.

COMMON MISTAKES

THESE CAN LEAD TO EQUIPMENT DAMAGE, SERIOUS INJURY OR DEATH.



Waiting until strong winds or storm arrives.



Leaving the turbine running in high winds.



Not shutting down before lightning or storm.



Leaving loose items that can be blown away.



Ignoring loose or damaged parts.

KEY MESSAGES

- Monitor weather and shut down early.
- Use OEM / preplanned safe shutdown method.
- Isolate, lock and secure the system.
- Check and secure the site and remove loose items.
- Do not restart until it is safe.
- Inspect for damage after the weather.
- When in doubt, stop the turbine and get advice.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

F06

RUNAWAY / LOSS OF CONTROL — STAND CLEAR

DO NOT APPROACH AN UNCONTROLLED ROTOR.

A runaway or uncontrobled rotor can accelerate, move or fail without warning.
Stay clear and keep people out of the danger zone.

RED
HIGH RISK
SERIOUS INJURY OR DEATH



KEEP PEOPLE OUT OF THE DANGER ZONE

If the turbine is running away, overspeeding or out of control, do not approach, do not try to stop it, do not unplug, block or apply a hand-brake.
Rotor speed and movement are unpredictable and can cause blade failure, thrown debris or tower collapse. Immediately evacuate to a safe distance and keep other people away.
Only trained and authorised personnel should deal with an uncontrolled turbine.

Do not approach, unplug, block or hand-brake an uncontrolled rotor.

1 RECOGNISE WARNING SIGNS



- Unusual noise, vibration or high rotor speed.
- Blade pitching not responding to control.
- Smoke, electrical faults or visible damage.
- Erratic movement or failure to stop.
- If in doubt, treat as a runaway / loss of control.

2 EVACUATE IMMEDIATELY



- Move away quickly and calmly to a safe distance.
- Take other people with you.
- Do not stop to collect tools, phones or equipment.
- Follow site evacuation routes and muster points.
- Warn others in the area.

3 DO NOT APPROACH



- Do not go near the turbine.
- Do not try to stop the rotor.
- Do not unplug, block or apply a hand-brake.
- Do not throw objects or use makeshift methods.
- Stay outside the marked danger zone.

4 ALERT AND ISOLATE



- Call the site supervisor or emergency contact.
- Isolate the system from the control room if safe and instructed to do so.
- Keep clear and provide accurate information about the situation.
- Do not re-energise or attempt to reset.

5 WAIT FOR AUTHORISED HELP



- Keep people out of the area.
- Wait for trained and authorised personnel (OEM or qualified technicians).
- Do not return until the area is declared safe.
- Follow instructions from emergency services and site management.
- Report the incident.

COMMON MISTAKES

THESE CAN LEAD TO BLADE FAILURE, THROWN DEBRIS, TOWER COLLAPSE OR DEATH.



Approaching the turbine to investigate.



Trying to stop the rotor or block the blades.



Unplugging cables or disconnecting power.



Using a hand-brake or makeshift method.



Staying inside the danger zone.

KEY MESSAGES

- Recognise warning signs early.
- Evacuate immediately and keep others away.
- Do not approach, stop, unplug or hand-brake.
- Alert the supervisor and isolate if instructed.
- Wait for trained and authorised personnel.
- Stay outside the marked danger zone.
- A runaway rotor can fail without warning.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

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ADAPT
SURVIVE

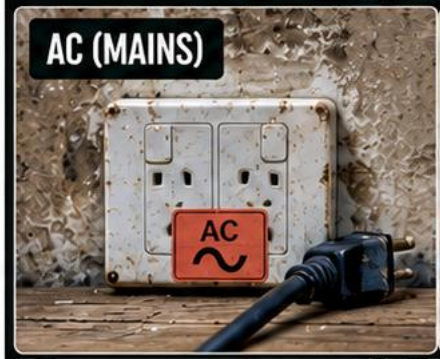
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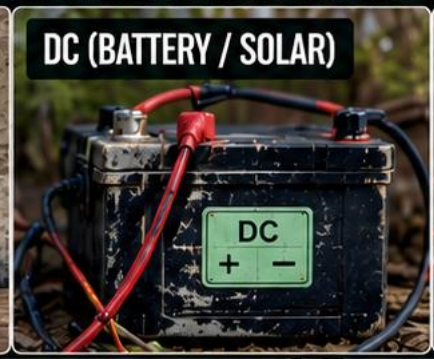
AC OR DC — IF YOU DON'T KNOW, DON'T CONNECT.

IDENTIFY THE OUTPUT TYPE BEFORE USE.

Different power sources can be AC or DC, with different voltage and polarity.
If you don't know what it is, do not connect. Use a label, meter or simple test first.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED







CHECK BEFORE YOU CONNECT

- Look for labels (AC / DC, voltage, polarity).
- Use a multimeter to confirm output type.
- Do not assume from wire count or connector type.
- Check the equipment and cable condition.
- If you are not sure, do not connect.
- Ask someone with electrical knowledge.

IDENTIFY FIRST. CONNECT ONLY WHEN SAFE.

1 LOOK FOR LABELS



- Check for AC or DC markings.
- Look for voltage and polarity.
- Read any existing labels.
- If no clear label, do not connect.

2 USE A METER



- Use a multimeter to check:
  - Voltage level.
  - AC or DC mode.
  - For DC, check polarity (+ and −).
- If you are not familiar, ask for help.

3 IDENTIFY THE SOURCE



- Common sources:
  - Grid power (usually AC).
  - Generator (usually AC).
  - Solar panel (usually DC).
  - Battery (DC).
  - Inverter (DC to AC).
- Do not assume — always confirm.

4 CHECK CONDITION



- Inspect cables, plugs and connectors for damage.
- Look for burnt marks, loose parts or corrosion.
- Do not use damaged equipment.
- Replace or repair before use if possible.

5 CONNECT ONLY WHEN SAFE



- Only connect when you know the output type and voltage.
- Use the correct equipment and cables.
- If in doubt, do not connect.
- It is safer to wait and get advice than to risk fire, equipment damage or injury.

COMMON MISTAKES

THESE CAN LEAD TO FIRE, EQUIPMENT DAMAGE, SERIOUS INJURY OR DEATH.



Connecting without checking the output type.



Assuming from connector type.



Using the wrong meter setting.



Using damaged cables or plugs.



Connecting incompatible equipment.

KEY MESSAGES

- If you don't know, don't connect.
- Use labels or a meter to identify AC or DC.
- Do not assume from wire count or connector type.
- Check the condition of equipment and cables.
- Only connect when you are sure it is safe.
- When in doubt, ask someone with electrical knowledge.
- Identify first. Connect only when safe.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

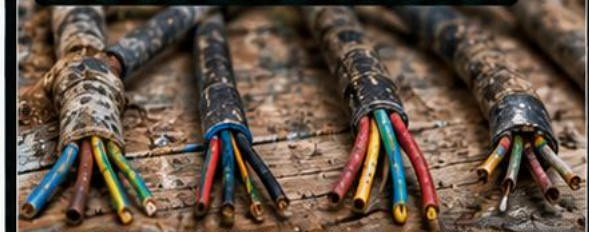
G02

RECTIFY ONLY WHEN REQUIRED.
DO NOT INFER TOPOLOGY FROM WIRE COUNT.

The number and colour of wires alone cannot tell you how a system is connected. Identify and confirm before any modification or repair.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

SAME WIRE COUNT, DIFFERENT SYSTEMS



AC MAINS (3 WIRES) | DC SYSTEM (3 WIRES) | THREE-PHASE (3 WIRES) | CONTROL / SIGNAL (3 WIRES)

COLOUR CAN BE MISLEADING



Old, modified or non-standard wiring may not follow usual colour codes.

TRACE THE WHOLE CIRCUIT



Follow the wires and confirm where they go.

UNDERSTAND BEFORE YOU RECTIFY

- Do not assume the circuit type or wiring method from wire count or colour.
- Trace and check where each wire goes.
- Use labels, photos and a meter if available.
- Identify whether it is AC, DC, single-phase, three-phase or control wiring.
- If you are not sure, do not modify.
- Ask someone with electrical knowledge.

CONFIRM FIRST. RECTIFY ONLY WHEN REQUIRED AND WHEN YOU UNDERSTAND THE SYSTEM.

1 LOOK, LABEL, PHOTOGRAPH



- Take clear photos before you start.
- Look for existing labels or markings.
- Note cable routes and connections.
- Do not rely on wire count or colour alone.

2 USE A METER



- Check for voltage and whether it is AC or DC.
- Use the correct meter setting.
- Check between wires and to earth/ground (if known).
- Confirm live wires before any modification.

3 IDENTIFY SYSTEM TYPE



- Common systems:
  - Grid power (usually AC).
  - Generator (usually AC).
  - Solar/ battery (usually DC).
  - Inverter (DC to AC).
  - Control systems (low voltage).
- Do not assume based on wire count or colour.

4 CONFIRM CONNECTIONS



- Trace where each wire goes.
- Check connection points.
- Compare with manuals, labels or diagrams (if available).
- Identify neutral, live, earth, positive, negative and control wires as applicable.
- If unsure, stop and get advice.

5 RECTIFY ONLY WHEN REQUIRED



- Only modify or repair when necessary.
- Use the correct method and parts.
- Keep connections secure and protected from water, dust and damage.
- If you are not confident, do not rectify.

COMMON MISTAKES

THESE CAN LEAD TO ELECTRIC SHOCK, FIRE, EQUIPMENT DAMAGE OR SYSTEM FAILURE.



Assuming wire count means a specific system.



Assuming colour is always correct.



Modifying without testing.



Mixing AC and DC systems by mistake.



Leaving loose or poor connections.

KEY MESSAGES

- Do not infer topology from wire count or colour.
- Identify and confirm before any modification.
- Use labels, photos and a meter.
- Understand the system type (AC, DC, control).
- Rectify only when required and when you understand it.
- If unsure, ask someone with electrical knowledge.
- Wrong assumptions can cause electric shock, fire, equipment damage or system failure.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

G03

REGULATION IS NOT A BATTERY CHARGER. THEY DO DIFFERENT JOBS.

A charge controller/charger charges a battery. A voltage regulator stabilises output to a safe level for your devices. Do not confuse them.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

BATTERY CHARGER / CHARGE CONTROLLER



- Charges a battery (AC or DC input).
- Controls charging voltage and current.
- Often used with solar panels or generators.

VOLTAGE REGULATOR



- Stabilises output to a fixed voltage (e.g. 12V or 5V) for devices.
- Does not charge a battery.
- Protects your equipment from overvoltage.

DO NOT CONFUSE



- They may look similar.
- Labels can be unclear or missing.
- Always check the function and specifications before connecting.

KNOW THE DIFFERENCE

- A battery charger puts energy into a battery and follows a charging process.
- A voltage regulator keeps the output at a steady voltage for your equipment.
- Using the wrong device can overcharge a battery, damage equipment, cause fire or fail to work.
- Check labels, model number, input/output range and function before use.

IDENTIFY THE DEVICE. USE IT ONLY FOR ITS INTENDED PURPOSE.

1 CHECK LABEL AND MODEL



- Look for words: charger, charge controller, regulator, DC-DC, converter.
- Check input and output specifications (voltage, current).
- If label is missing or unclear, do not use until confirmed.

2 UNDERSTAND THE FUNCTION



- Charger/charge controller is for charging a battery.
- Follows a charging process (e.g. bulk, absorb, float).
- Not a constant power supply for other devices.
- Common in solar or generator setups.

3 VOLTAGE REGULATOR



- Keeps the output at a stable voltage (e.g. 5V, 12V).
- Used to power devices such as lights, radio, router, etc.
- Does not charge a battery.
- Input voltage is usually a range (e.g. 8-36V).

4 CHECK YOUR SYSTEM



- Identify the power source (solar, generator, vehicle, etc).
- Identify whether you need to charge a battery or power a device.
- Check that the device matches your system voltage and purpose.
- Do not mix charger and regulator.

5 CONNECT ONLY WHEN SURE



- Use the correct device for the correct purpose.
- Check polarity, voltage and current rating.
- Ensure cables and connectors are in good condition.
- If unsure, ask someone with electrical knowledge.

COMMON MISTAKES

THESE CAN LEAD TO OVERCHARGING, EQUIPMENT DAMAGE, FIRE OR SYSTEM FAILURE.



Using a voltage regulator to charge a battery.



Using a charger to power devices directly.



Ignoring or misreading labels and specifications.



Using the wrong voltage or current rating.



Connecting with incorrect polarity or poor connections.

KEY MESSAGES

- A charger charges a battery. A regulator stabilises output.
- Do not confuse charger, charge controller and regulator.
- Check labels, model number and specifications.
- Use the correct device for the correct purpose.
- Do not mix charger and regulator.
- When unsure, ask someone with electrical knowledge.
- Correct identification and use helps prevent overcharging, equipment damage, fire and system failure.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

G04

FUSES PROTECT CONDUCTORS & FAULTS.
SELECT PER SYSTEM / OEM; NO UNIVERSAL VALUE.

Fuses are designed to protect wires, equipment and people from overcurrent and faults.
Using the wrong fuse can cause overheating, fire, equipment damage or system failure.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

AUTOMOTIVE / VEHICLE FUSE



Blade fuses (e.g. 5A, 10A, 15A, 20A…).
Used in vehicles and many DC systems.

GLASS / CERAMIC FUSE



Glass or ceramic fuses.
Used in many AC and DC devices.

CIRCUIT BREAKER / FUSE HOLDER



High-current fuses and manual reset breakers.
Used for batteries, inverters and heavy loads.

PROTECTS PEOPLE AND EQUIPMENT

- A fuse is designed to melt and open the circuit when current is too high.
- It protects wires, cables and equipment from overheating and fire.
- Use the correct type, rating, voltage and size for your system and equipment.
- Always follow OEM/manual specifications.
- If in doubt, ask someone with electrical knowledge.

USE THE CORRECT FUSE. DO NOT USE A HIGHER RATING OR A DIFFERENT TYPE AS A REPLACEMENT.

1 FIND THE SPECIFICATION



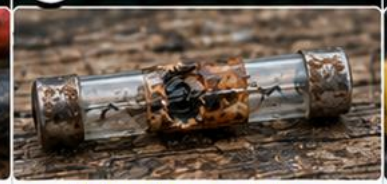
- Check the equipment label, manual or OEM specification.
- Find the required fuse type and rating (e.g. 15A).
- Check whether it is AC or DC.
- Look for any special fuse type (e.g. blade, glass, ceramic, slow-blow, etc.).

2 CHECK WIRE SIZE



- The fuse rating must match the wire size and equipment.
- Fuses protect the wires from overheating.
- If the wire size changes, the fuse rating may also need to change.
- If unsure, ask someone with electrical knowledge.

3 CHECK FUSE CONDITION



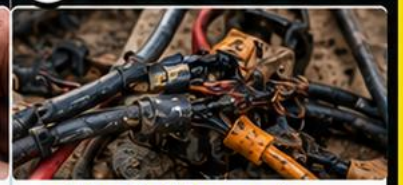
- A blown fuse usually has a broken or melted link.
- Check for signs of heat, burn marks or discolouration.
- Find and fix the reason for the fuse blowing before replacing it.
- Do not keep replacing fuses without finding the fault.

4 REPLACE WITH CORRECT TYPE



- Use the same type and rating as specified (e.g. 15A blade fuse).
- Do not use a higher-rated fuse.
- Do not use a different type (e.g. wire, coin, nail, etc.).
- Make sure it fits properly and has a good connection.
- Keep spare fuses of correct type and rating.

5 IF IT BLOWS AGAIN



- A fuse that blows again indicates a fault (e.g. short circuit, overload or equipment problem).
- Do not keep replacing fuses.
- Stop using the equipment and investigate the cause.
- If you cannot identify the fault, get advice from someone with electrical knowledge.

COMMON MISTAKES

THESE CAN LEAD TO OVERHEATING, FIRE, EQUIPMENT DAMAGE OR SYSTEM FAILURE.



Using wire, foil or other objects instead of a fuse.



Using a higher-rated fuse than specified.



Using the wrong type or size fuse.



Bypassing or removing the fuse.



Keep replacing fuses without finding the fault.

KEY MESSAGES

- Fuses protect conductors, equipment and people.
- Use the correct type, rating and size for your system.
- Follow OEM/manual specifications.
- Do not use a higher-rated or different type fuse.
- If a fuse blows, find and fix the fault.
- Keep spare fuses of correct type and rating.
- If unsure, ask someone with electrical knowledge.
- Correct fuse use helps prevent fire, equipment damage and system failure.

G05

LOW-VOLTAGE MULTIMETER TEST FLOW.
KNOWN SOURCE → TARGET → CHECK.

Use a clear and simple test flow to check low-voltage circuits safely.
Know the source first, then test the target step by step. Do not guess.

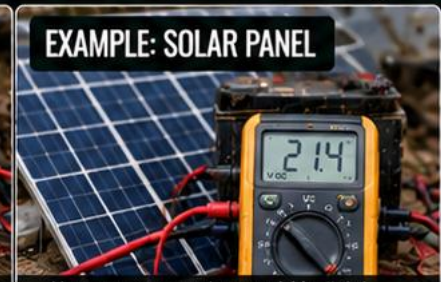
AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

EXAMPLE: 12V BATTERY



- **Known source:** 12V battery.
- Check voltage at the terminals.
- Confirm correct DC range and polarity.

EXAMPLE: SOLAR PANEL



- Known source: solar panel (daylight).
- Open-circuit voltage may be higher.
- Check under sunlight and in safe condition.

EXAMPLE: 12V LOAD (LIGHT)



- Known source: 12V system.
- Check at the load (e.g. light, pump).
- Compare with source and trace if low.

FOLLOW THE TEST FLOW

- Know the source (voltage type and range).
- Set the meter to the correct mode (AC or DC) and range.
- Test at the source first to confirm.
- Test at the target (e.g. socket, device, wire).
- Compare the results and look for voltage drop.
- Check polarity for DC (+ and –).
- If the result is not as expected, stop and re-check.

TEST STEP BY STEP. DO NOT GUESS.

1 KNOW THE SOURCE



- Identify the power source (battery, solar panel, generator, vehicle, etc.).
- Find the expected voltage and DC or AC type.
- Check labels or manual if available.
- If unknown, ask someone with electrical knowledge.

2 SET THE METER



- Select the correct mode: V DC for DC (e.g. 12V, 24V).
- V AC for AC (e.g. 230V).
- Start with a suitable range (e.g. 20V or 200V).
- Check the meter and leads are in good condition.
- Use black to COM, red to V.

3 TEST THE SOURCE



- Measure at the source first to confirm the actual voltage.
- Check the value is within expected range.
- For DC, check polarity (+ and –).
- If no voltage or very low, stop and find the cause.

4 TEST THE TARGET



- Measure at the target point (socket, device, end of wire).
- Compare with the source.
- A lower voltage may indicate a long cable, high load or a poor connection.
- Trace back towards the source if the voltage is much lower than expected.

5 CHECK AND DECIDE



- Compare the readings and identify where the voltage drop happens.
- Check connections, cables, fuses and devices.
- Resolve loose, damaged or corroded parts.
- If unsure or if the voltage is incorrect, stop and get advice.

COMMON MISTAKES

THESE CAN LEAD TO WRONG READINGS, EQUIPMENT DAMAGE OR INJURY.



Using the wrong mode (AC instead of DC or vice versa).



Using the wrong range.



Reversed polarity on DC.



Testing without knowing the source and expected value.



Using damaged leads or poor connections.

KEY MESSAGES

- Know the source, expected voltage and type.
- Use the correct meter mode and range.
- Test the source first, then the target.
- Compare the readings and look for voltage drop.
- Check polarity for DC.
- Do not guess. If the result is not as expected, stop and re-check.
- Fix poor connections, damaged cables and fuses.
- If unsure, ask someone with electrical knowledge.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

G06

CONTROLLED POWER-ON TEST.
HANDS OFF → ENERGISE → OBSERVE → DE-ENERGISE.

Power on slowly and safely. Keep your hands off. Observe and measure before any adjustment or further work. Do not assume — confirm what you see and measure.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

USED BUT CLEAN EQUIPMENT



- Used or second-hand equipment can be safe.
- Clean, dry and inspect before testing.
- Check labels and specifications.

USE A SWITCH / ISOLATION



- Use a proper switch, isolator or plug.
- Keep hands off moving parts and live areas.
- Make sure you can quickly power off.

OBSERVE AND MEASURE



- Check voltage, current and any abnormal noise, smell, vibration or heat.
- Compare with expected range.
- If anything is abnormal, power off.

KEY POINTS BEFORE POWER ON

- Inspect the device, cables and connections.
- Make sure the setup is safe and stable.
- Use a switch/isolator and be ready to power off.
- Use a current-limited supply if available.
- Observe and measure: voltage, current, noise, vibration, temperature.
- Do not touch while powered.
- If results are not as expected, stop and check.

ENERGISE, OBSERVE, DE-ENERGISE BEFORE ANY ADJUSTMENT OR REPAIR.

1 PREPARE AND CHECK



- Check the device and cables for damage.
- Confirm it is clean and dry.
- Check labels and specifications.
- Set up in a stable and safe position.
- Make sure you have a quick off switch.

2 ENERGISE



- Turn on the power using a switch or isolator.
- Stand back and keep clear.
- Do not touch the equipment while it is powered.
- Use a current-limited supply if available.
- Be ready to switch off immediately if needed.

3 OBSERVE AND MEASURE



- Check the output voltage and current.
- Listen for abnormal noise.
- Watch for smoke, smell or heat.
- Look for unusual vibration or behaviour.
- Compare with expected range for this device.

4 DE-ENERGISE



- Turn off the power.
- Allow the device to fully stop.
- Wait for it to cool if necessary.
- Only then consider any adjustment, further testing or repair.

5 DECIDE NEXT STEP



- If results are as expected, continue to the next step.
- If there are abnormal readings or behaviour, stop and find the cause.
- Do not proceed if you are unsure. Ask someone with electrical knowledge.

COMMON MISTAKES

THESE CAN LEAD TO ELECTRIC SHOCK, FIRE, EQUIPMENT DAMAGE OR SERIOUS INJURY.



Using damaged cables or loose connections.



Touching live parts while powered.



Using the wrong meter range.



Removing covers or adjusting while powered.



Ignoring smoke, heat, noise or unusual behaviour.

KEY MESSAGES

- Power on in a controlled and safe way.
- Keep your hands off moving parts and live areas.
- Use a switch/isolator and a current limit if available.
- Observe and measure: voltage, current, noise, vibration, temperature.
- Do not touch while powered.
- Only adjust or modify while powered if necessary and safe.
- If unsure, ask someone with electrical knowledge.
- Correct testing helps prevent fire, equipment damage and serious injury.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

G07

INCANDESCENT / KNOWN LOAD — AUXILIARY CLUE ONLY.
USE A KNOWN LOAD AS A SIMPLE REFERENCE.

A light bulb or resistive load can give a rough idea of the output type and order of magnitude. It is not a fuse, not a precise measurement, and not proof of exact parameters.

AMBER
MEDIUM RISK
INCREASE AWARENESS REQUIRED

INCANDESCENT BULB (AC/DC)



- A simple resistive load.
- Can give a rough idea if there is usable voltage.
- Works on AC or DC (within rating).

12V AUTOMOTIVE BULB (DC)



- Common 12V known load.
- Rough check for low-voltage DC source.
- If it does not light or is very dim, voltage may be low or source not suitable.

RESISTIVE LOAD (e.g. HEATER)



- Higher power known load.
- Can help confirm a stronger source.
- Watch for heat, loose connectors and cable condition.

WHAT A KNOWN LOAD CAN TELL YOU

- Whether there is usable voltage.
- Rough indication of AC or DC behaviour.
- Relative strength (e.g. 12V vs higher voltage).
- Stability (does it stay on or flicker).
- Helps identify a possible source and circuit.
- Useful when you do not have a meter or labels.

IT IS ONLY A CLUE. NOT A FUSE, NOT A METER, AND NOT PROOF OF EXACT VOLTAGE, CURRENT OR POWER.

1 PREPARE A KNOWN LOAD



- Use a suitable known load:
  - Incandescent bulb (AC/DC)
  - 12V automotive bulb (DC)
  - Small heater or resistive load
- Ensure the load is in good condition and safe to use.

2 CONNECT SAFELY



- Use proper cables and connectors.
- Check polarity for DC (+ and –).
- Make sure connections are firm and not loose.
- Keep hands clear of live parts.

3 OBSERVE THE RESULT



- If the bulb lights normally, the source likely has usable voltage and power.
- If it is dim, flickers or does not light, the voltage may be low, unstable or the source not suitable.
- Observe for abnormal heat, smell or noise.

4 COMPARE AND JUDGE



- Compare with expected behaviour for the load.
- Use it only as a rough reference (e.g. 12V bulb on 12V source).
- It does not give exact voltage, current or power.
- If the result is unusual, stop and investigate.

5 DECIDE NEXT STEP



- If the result is as expected, you can proceed with further checks or limited use.
- If it is dim, unstable or abnormal, do not use the source yet.
- If unsure, ask someone with electrical knowledge.

COMMON MISTAKES — THESE CAN LEAD TO FIRE, EQUIPMENT DAMAGE OR INJURY.



Using the wrong voltage-rated load.



Using LED or electronic loads (not reliable).



Loose or damaged connections.



Ignoring overheating, smoke or unusual smell.



Holding the bulb or load while powered.

KEY MESSAGES

- A known load (incandescent bulb or resistive load) can help identify a possible source.
- It does not give exact voltage, current or power.
- LED and electronic devices are not reliable for this test.
- Use the correct load, rating and safe connections.
- Observe carefully for abnormal behaviour.
- If the result is not as expected, stop and get advice.
- Your safety and the safety of others comes first.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

G08

NO METER — WHAT YOU CAN & CANNOT KNOW.

SAFE SCREENING MAY BE POSSIBLE;
EXACT VOLTAGE/POWER MUST NOT BE GUESSED.

Without a meter, you can look, read and observe, but you cannot know exact voltage, current or power. When unsure — STOP and get advice.

GREEN
PUBLIC ACTION
SAFE TO FOLLOW
LOW RISK

LOOK FOR LABELS



- Look for clear labels, markings or model.
- Note input and output information.
- Identify known voltage (e.g. 5V, 12V, 24V).
- Check manufacturer and model if possible.

RECOGNISE COMMON DEVICES



- Use visual clues and common designs.
- Chargers, LED lights, routers and laptops often have labels and known voltage.
- Compare with similar, familiar devices.

CHECK PHYSICAL CONDITION



- Check for obvious damage, cracks, burnt marks or swollen parts.
- Make sure it looks dry and clean.
- If damaged or suspicious — do not use.

KEY POINTS

- You can identify the type of device by labels, shape and common design.
- You can know a general idea of voltage type (e.g. 5V USB, 12V, 24V, AC mains) from labels.
- You can check for obvious damage or risk.
- You cannot know the exact voltage, current or power without a meter.
- Do not guess or assume the output.
- If it is not clearly known or the label is missing, do not use.
- When in doubt — STOP and get advice.

SAFE SCREENING MAY BE POSSIBLE;
EXACT VOLTAGE/POWER MUST NOT BE GUESSED.

WHAT YOU CAN KNOW (SAFE OBSERVATION)



- Nominal voltage type from **clear label** (e.g. 5V USB, 12V, 24V).
- Input type (AC or DC).
- Manufacturer, model, specifications text.
- Connector type and size.
- General device type (charger, light, motor, etc.).



- Connector type (shape and polarity clues).
- Compare with similar, familiar devices.
- Look up model information if possible (offline manuals).
- Check if the device looks complete and undamaged.



- Whether it is likely AC input and lower voltage DC output (e.g. charger/power adapter).
- Whether it is likely a known low-voltage device (e.g. LED light, router).
- Whether it looks old but still in reasonable condition.

WHAT YOU CANNOT KNOW (DO NOT GUESS)



- Exact output voltage.
- Exact current or power.
- Real capacity of a battery.
- Internal condition or safety.
- Whether a damaged device is still safe to use.



- Do not assume a voltage just from size or shape.
- Do not guess based on colour or connector alone.
- Do not trust damaged, swollen or modified devices.



- Do not use if the label is missing or unreadable.
- Do not open unknown devices (risk of shock, fire, chemical exposure).
- Do not try to test unknown mains voltage (e.g. 100–240V) without proper equipment.

WARNING

- A wrong assumption can cause electric shock, fire, explosion or serious injury.
- No meter = you cannot confirm exact voltage, current or power.
- If a safe method to confirm is not available — STOP.

NEXT STEP

- If the device is clearly identified and in good condition, you may use it.
- If you are not sure, do not use and seek advice.
- For further testing with proper equipment, see CH01.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

CH01 GENERATOR & BATTERY CHARGER

Establish the generator → control → protection → battery concept.

GREEN
PUBLIC ACTION
SAFE TO FOLLOW
LOW RISK

1. IDENTIFY THE GENERATOR



- Find the generator and check the label.
- Identify AC or DC output.
- Note the model and basic specifications.
- Check for obvious damage or missing parts.

2. CONTROL AND PROTECTION



- Use the engine switch to start/stop.
- Check for circuit breaker or fuse.
- Make sure protection devices work.
- Do not use if protection is missing or damaged.

3. BATTERY CHARGER CONCEPT



- Use a charger suitable for the battery type.
- Follow the manufacturer's instructions.
- Do not use chargers for different battery types.
- Charge in a safe, ventilated area away from heat and moving parts.

KEY POINTS

- A generator provides electrical power.
- Check AC or DC output and basic specifications.
- Use proper control and protection devices.
- Use a charger suitable for the battery type.
- Follow the manufacturer's instructions.
- Do not modify or bypass safety devices.
- Work in a safe, ventilated area.
- If unsure, do not use and seek advice.

WHAT YOU CAN DO (BASIC CHECK)



- Read the label and identify output type (AC/DC).
- Note voltage, frequency and power rating.
- Check manufacturer and model.



- Check fuel level and condition.
- Check for obvious leaks or damage.
- Make sure the ge-generator is stable a and on level ground.



- Check that sockets, switches and circuit breaker are present and secure.
- Look for signs of overheating, burning or loose parts.



- Use a correct charger for the battery type.
- Check leads and connectors are in good condition.
- Keep cables away from heat and moving parts.

WHAT YOU CANNOT DO (DO NOT)



- Do not use a damaged generator.
- Do not bypass or remove safety devices.
- Do not use if there are fuel, oil or electrical leaks.



- Do not use a charger for an unknown or different battery type.
- Do not modify the charger or generator.
- Do not charge in enclosed or poorly ventilated areas.



- Do not overload the generator.
- Do not connect unsafe or makeshift wiring.
- Do not use near flammable materials.
- Do not attempt repairs beyond your knowledge.

WARNING

- Incorrect use can cause electric shock, fire, explosion or serious injury.
- Follow labels and manufacturer instructions.
- If unsure — do not use and seek advice.

NEXT STEP

- If the generator works and output is identified, check the actual output voltage and compatibility (see CH02).
- If not sure, do not connect a charger or battery yet.

CH02 IDENTIFY GENERATOR OUTPUT

AC/DC, polarity where relevant, controller input compatibility.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. FIND OUTPUT INFORMATION



- Look for labels, markings or model number.
- Note AC or DC output, voltage and frequency.
- Check maximum power rating (e.g. 2.0kW).
- If there is no clear label, check the manual if available.

2. CHECK AC OR DC OUTPUT



- AC output is usually 100–240V and 50/60Hz (country dependent).
- DC output is lower voltage (e.g. 12V, 24V).
- Identify each output separately.
- Do not assume both are available.
- If unclear, treat the output as unknown.

3. CHECK POLARITY (DC ONLY)



- For DC output, identify positive (+) and negative (–).
- Check markings, colour and wiring.
- If no clear marking, do not guess.
- If polarity is uncertain, do not connect sensitive devices.

KEY POINTS

- Identify whether the output is AC or DC.
- Check the voltage and frequency or DC voltage.
- Check the maximum power rating.
- For DC, confirm polarity where relevant.
- Make sure it matches the input requirements of your controller/charger.
- If there is no meter and the output is unknown, do not connect — STOP.
- When in doubt, seek advice or test with a simple, robust load first.

WHAT YOU CAN DO (SAFE CHECK)



- Read the label carefully.
- Identify AC/DC, voltage, frequency and power.
- Note manufacturer and model.



- Identify output type from socket shape.
- Compare with familiar devices.
- Look for international symbols and markings.



- Check polarity markings.
- Use colour (red = +, black = –) as a guide.
- Verify cable condition and tightness.



- If the output is clearly identified, test with a simple, robust load (e.g. work light).
- Observe normal behaviour.
- If abnormal (flicker, noise, overheating), stop and investigate.

WHAT YOU CANNOT DO (DO NOT)



- Do not guess or assume the exact voltage.
- Do not assume the current or power.
- Do not rely on colour or connector alone.



- Do not connect devices with unknown or incompatible input.
- Do not use sensitive electronics for testing.
- Do not bypass protection devices.



- Do not mix AC and DC connections.
- Do not try to identify output by sound, heat or small sparks.
- Do not overload the generator.
- Do not modify or disable safety devices.

WARNING

- Incorrect connection can damage equipment, cause fire, electric shock or serious injury.
- If the output is not clearly identified, do not connect any device.
- Use only equipment that matches the output and rated power.

NEXT STEP

- If the output is identified and matches your controller or charger input, go to CH03 (Rectify Only If Required).
- If unsure, do not connect and seek advice.

CH03 RECTIFY ONLY IF REQUIRED

Prefer original or matched enclosed rectifier modules.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. CHECK IF RECTIFICATION IS NEEDED



- Determine if the generator output is AC and needs rectification.
- Some generators or devices may already have an internal rectifier.
- Look for labels, wiring diagrams or documentation if available.

2. USE ORIGINAL OR MATCHED MODULE



- Prefer the original rectifier module or a matched replacement.
- Ensure voltage and current rating meet or exceed the original.
- Use enclosed, rugged modules designed for the device.
- Avoid unproven or unknown modules.

3. INSPECT AND INSTALL



- Check for burn marks, cracks or damaged parts.
- Make sure wiring and connectors are clean, tight and correctly routed.
- Ensure good cooling and ventilation.
- Follow the manufacturer's diagram or markings for AC input and DC output (+ / –).

KEY POINTS

- Rectification is only needed if the generator output is AC and DC is required.
- Prefer original or matched enctiosed rectifier modules.
- Check voltage and current rating.
- Ensure correct AC input and DC output (+ / –).
- Mount securely with good cooling.
- Do not use unproven or makeshift rectifiers.
- If unsure, do not modify and seek advice.

USE ORIGINAL OR MATCHED RECTIFIERS.
DO NOT USE UNPROVEN OR MAKESHIFT MODULES.

GOOD EXAMPLES (SUITABLE RECTIFIERS)



- Original equipment module from the device.
- Enclosed and rugged design.
- Correct voltage and current rating.



- Standard bridge rectifier module.
- Rated for required voltage and current.
- Use with proper mounting and cooling.



- Matched replacement module.
- Same or higher rating as original.
- Designed for generator or vehicle use.



- OEM rectifier assembly for alternator/generator.
- Correct type and rating.
- Clean, undamaged and properly mounted.

BAD EXAMPLES (DO NOT USE)



- Do not use loose diodes or handmade rectifiers.
- No guarantee of correct rating or cooling.
- High risk of failure, fire or equipment damage.



- Do not use improvised or exposed rectifiers.
- Not suitable for high current or vibration.
- High risk of overheating, short circuit or fire.



- Do not use unknown or unlabelled modules.
- Cannot confirm type, voltage or current rating.
- High risk of failure, fire or serious injury.

WARNING

- Using the wrong or unproven rectifier can cause overheating, fire, equipment damage or serious injury.
- Follow manufacturer specifications and correct wiring.
- If unsure, do not modify the rectification and seek advice.

NEXT STEP

- After rectification is confirmed or installed correctly, choose a matched commercial charge controller (see CH04).
- Do not proceed to connect a battery yet.

CH04 CHOOSE A MATCHED COMMERCIAL CHARGE CONTROLLER

Manufacturer must support source, input range and target battery.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. MATCH THE BATTERY TYPE



- Know the battery type: Lead-acid, LiFePO4 or Lithium-ion.
- Use a controller that specifically supports your battery type.
- Check the required charge profile (e.g. 12V lead-acid, 12.8V LiFePO4).

2. CHECK INPUT COMPATIBILITY



- Check the input source (solar, generator, vehicle alternator, etc.).
- Confirm input voltage range (e.g. 9–32V).
- Make sure the controller is compatible with your power source and can handle the expected input voltage.

3. CHECK CHARGE OUTPUT



- Check the output voltage and charge mode (e.g. AGM, GEL, Flooded, LiFePO4).
- Ensure adjustable or correct preset settings for your battery.
- Check the maximum charging current matches your battery and power source.

KEY POINTS

- Use a commercial charge controller designed for your battery type.
- Check input source and voltage range.
- Check output voltage, charge mode and maximum current.
- Follow the manufacturer's instructions.
- Use quality, reliable devices.
- Do not modify or bypass the controller.
- If unsure, do not connect — seek advice.

MANUFACTURER MUST SUPPORT SOURCE, INPUT RANGE AND TARGET BATTERY.

SUITABLE CHARGE CONTROLLERS (EXAMPLES)



- MPPT solar charge controller.
- Supports correct battery types and input range.
- Adjustable settings.



- PWM controller.
- Suitable for smaller systems.
- Supports correct battery type.
- Clear labelling and basic settings.



- DC-DC charger (e.g. from vehicle).
- Supports battery type and correct charge profile.
- Rated input and output.
- Suitable for alternator or vehicle systems.



- Commercial battery charger with correct charge mode.
- Suitable for lead-acid or LiFePO4.
- Follow manufacturer's instructions.

UNSUITABLE / HIGH RISK (DO NOT USE)



- No clear label or model.
- Unknown battery type support.
- Unknown input/output range.
- High risk of wrong voltage or damage.



- Cheap or unbranded controllers.
- No clear specifications.
- Unsuitable for your battery type.
- High risk of overcharging, fire or damage.



- Homemade or modified controllers.
- No proper protection.
- Unknown settings and safety.
- Do not use.

WARNING

- Using the wrong charge controller can cause overcharging, fire, explosion or serious injury.
- Always follow manufacturer specifications and correct settings.
- If unsure — do not use and seek advice.

NEXT STEP

- After selecting a suitable charge controller, follow the connection and de-energised checklist (see CH05).
- Do not connect any batteries yet.

CH05 CONNECT EVERYTHING DE-ENERGISED

BUILD DEAD + FOLLOW OEM ORDER.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. CONFIRM EVERYTHING IS OFF



- Generator engine switch OFF.
- Charger/controller OFF.
- No AC or DC output.
- Allow time to cool if recently used.

2. CONNECT IN CORRECT ORDER



- Connect battery first (to controller).
- Then connect source (generator/solar).
- Follow the controller's manual order.
- Use correct cable size and polarity.

3. CHECK CONNECTIONS



- Make sure connections are tight.
- Check correct polarity (+ / -).
- Ensure cables are in good condition.
- Keep connections clean and dry.

KEY POINTS

- Make all connections when everything is de-energised.
- Follow the manufacturer's connection order.
- Use correct polarity and cable size.
- Ensure all connections are tight, clean and secure.
- Check for damaged cables, loose terminals or signs of overheating.
- If unsure about the correct order or cables — STOP and seek advice.

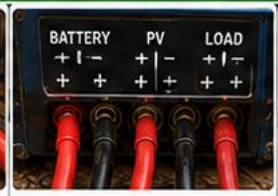
GOOD CONNECTIONI EXAMPLES (DE-ENERGISED)



- Correct polarity (red = +, black = -).
- Clean and tight connection.
- Proper cable size.



- Use proper fuse or circuit breaker where required.
- Correct rating.
- Clean and secure.



- Follow controller's label and manual.
- Correct terminals and polarity.
- Cables routed neatly and safely.



- Cables supported and protected.
- Keep away from heat, moving parts and sharp edges.
- Maintain ventilation.

BAD EXAMPLES (DO NOT DO)



- Do not use damaged, frayed or cut cables.
- Do not use makeshift connections.
- High risk of short circuit, fire or equipment damage.



- Do not connect with wrong polarity.
- Do not leave loose or poorly tightened connections.
- Can cause serious damage.



- Do not create messy or unsupported wiring.
- Do not run cables through hot or moving parts.
- High risk of wear, short circuit or fire.



- Do not make connections in wet, dirty or corroded conditions.
- Do not use if terminals are rusty or damaged.
- Clean and dry first.

WARNING

- Incorrect connection order or polarity can damage equipment, cause fire or serious injury.
- Always follow the manufacturer's instructions and specifications.
- If unsure — do not connect and seek advice.

NEXT STEP

- After all connections are made and checked, proceed to CH06.
- Then follow the correct charging procedure for your battery type.
- If unsure, double-check the setup or seek advice before powering on.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

CH06 CHARGE 12V LEAD-ACID BY BATTERY/OEM PROFILE

No universal charge voltage; do not force-charge unknown batteries.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. IDENTIFY BATTERY TYPE



- Read the label and identify the type: Flooded (wet), AGM, GEL or EFB.
- Note the rated voltage (12V) and capacity (e.g. 50Ah, 60Ah, 100Ah).
- Check manufacturer and model if possible.

2. USE CORRECT CHARGER



- Use a charger with the correct 12V lead-acid mode for your battery type.
- Select the proper mode (Flooded / AGM / GEL / EFB).
- Use a quality charger from a trusted brand.
- Follow the manufacturer's instructions.

3. CHARGE AND MONITOR



- Connect correctly (+ / –).
- Start charging and monitor the process.
- Make sure charging voltage and current are appropriate for the selected mode.
- Keep the area ventilated.
- Do not leave unattended for a long time.

KEY POINTS

- Use the correct charger mode for the battery type (Flooded / AGM / GEL / EFB).
- Follow the manufacturer's recommended voltage and charging profile.
- Do not use a universal or unknown charger without a 12V lead-acid mode.
- Keep good ventilation during charging.
- Monitor for abnormal heat, swelling, leakage or smell.
- If unsure about the battery type or correct settings — do not charge and seek advice.

CORRECT EXAMPLES (12V LEAD-ACID)



- 12V flooded lead-acid battery.
- Use charger with Flooded mode.
- Follow manufacturer's voltage and current.



- 12V AGM battery.
- Use charger with AGM mode.
- Correct voltage profile.
- Monitor temperature.



- 12V GEL battery.
- Use charger with GEL mode.
- Follow manufacturer's settings.
- Keep ventilated.



- Quality 12V charger with selectable modes.
- Correct charge profile.
- Automatic charge control and protection.
- Use in a safe, dry, ventilated area.

WRONG EXAMPLES (DO NOT DO)



- Do not use unknown or unbranded chargers.
- No clear charge profile.
- High risk of overcharge, fire or battery damage.



- Do not use the wrong voltage (e.g. 24V) on a 12V battery.
- Can cause serious damage, fire or explosion.



- Do not use a car engine or alternator as a charger.
- Uncontrolled voltage and high risk of overcharge and battery damage.



- Do not charge a damaged, swollen or leaking battery.
- Do not charge if there is a strong smell, heat or visible damage.
- Isolate and seek advice.

WARNING

- Incorrect charging can cause overheating, fire, explosion or serious injury.
- Always follow the battery and charger manufacturer's specifications.
- If unsure about the battery type, condition or correct charger settings — do not charge and seek advice.

NEXT STEP

- When charging is complete and the battery is stable, go to CH07 (Charge Complete Lithium Products).
- If there are signs of abnormal heat, smoke, gas, swelling or leak — go to CH08 (Monitor, Shut Down & Disconnect).

CH07 CHARGE COMPLETE LITHIUM PRODUCTS

Controlled low-voltage output → correct/original charger → designed charge port.

GREEN
LOW RISK
FOLLOW STEPS
STAY WITHIN DESIGN

1. IDENTIFY PRODUCT AND PORT



- Confirm it is a complete, intact product.
- Identify the designed charge port.
- Look for labels (voltage, model, charging method).
- Check for physical damage, swelling or leaks.

2. USE THE CORRECT/ORIGINAL CHARGER



- Use the original charger where possible.
- If replacement, use correct voltage and connector.
- Follow the manufacturer's instructions.
- Ensure the charger is in good condition.

3. CHARGE IN A SAFE ENVIRONMENT



- Place on a non-flammable surface.
- Keep the area ventilated.
- Start charging and monitor for abnormal heat, smell, swelling or noise.
- Do not leave unattended for a long time.

KEY POINTS

- Use a controlled low-voltage output with correct/original charger.
- Only charge products designed for charging via the identified port.
- Do not modify the product or charger.
- Keep the product in good condition (no swelling, leaks or damage).
- Charge in a safe, ventilated area.
- Monitor for abnormal heat, smoke, smell or other signs.
- If in doubt, do not charge and seek advice.

GOOD EXAMPLES (COMPLETE LITHIUM PRODUCTS)



- Laptop with USB-C charge port.
- Use original or compatible charger.
- Correct voltage profile.
- Normal condition.



- Power tool battery with dedicated charger.
- Use the correct manufacturer charger.
- Charge in a ventilated area.
- Monitor while charging.



- E-bike battery with designed charge port.
- Use the correct charger and voltage.
- Follow manufacturer's instructions.
- Keep the battery stable and dry.



- Portable power station with labelled input (e.g. 12–24V).
- Use the original or correct charger.
- Monitor charging status.
- Ensure good ventilation.

WRONG EXAMPLES (DO NOT DO)



- Unlabelled or unknown lithium pack.
- Do not charge.
- Type, voltage and condition are unknown.
- High risk of fire, explosion or injury.



- Wrong charger or wrong voltage.
- Do not use 12V or other incorrect chargers.
- Can cause overheating, fire or battery damage.



- Damaged, swollen or leaking battery.
- Do not charge.
- High risk of fire, explosion or serious injury.



- Do not use makeshift charging methods.
- Do not connect directly to cells.
- Do not use unknown power sources.
- High risk of fire, explosion or injury.

WARNING

- Incorrect charging can cause overheating, fire, explosion or serious injury.
- Only charge complete, intact products using the correct charger and settings.
- If unsure about the product or charger, do not charge and seek advice.

NEXT STEP

- After charging is complete and the product is stable, proceed to CH08 (Monitor, Shut Down & Disconnect).
- If there are signs of abnormal heat, smoke, gas, swelling or leak — go directly to CH08.

CH08 MONITOR, SHUT DOWN & DISCONNECT

Stop on abnormal heat/smoke/gas/swelling/water/mechanical instability; isolate per OEM.

AMBER
MEDIUM RISK
REQUIRES CAUTION
FOLLOW STEPS

1. MONITOR DURING CHARGING



- Stay nearby and check regularly.
- Monitor for abnormal heat, smoke, smell, noise or unusual behaviour.
- Check charging indicators and temperature (by touch, if safe).

2. SHUT DOWN IF ABNORMAL



- Stop charging immediately if there are signs of abnormal heat, smoke, gas, swelling, water or strange noise.
- Turn off the charger and power source.
- Do not continue charging to "see what happens".

3. DISCONNECT AND ISOLATE



- Disconnect the battery from the charger.
- Isolate the battery in a safe area (non-flammable, well-ventilated).
- Keep away from other equipment, people and combustible materials.
- Follow manufacturer's guidance for further action.

KEY POINTS

- Monitor charging at all times if possible.
- Shut down immediately if you see or smell abnormal heat, smoke, gas, swelling, water or mechanical instability.
- Turn off charger and power source first.
- Disconnect the battery and isolate it in a safe, ventilated area.
- Do not touch a hot, swollen or damaged battery.
- Follow the OEM's instructions for inspection, storage, disposal or professional support.
- When in doubt, keep distance and seek advice.

NORMAL EXAMPLES (CONTINUE MONITORING)



- Charger indicator shows normal status.
- No abnormal heat, smell or noise.



- Charger operating within normal range.
- Cables and connectors are intact and cool.



- Battery charging normally.
- No swelling, leakage or damage.



- Clean, secure connections.
- Proper cable size and routing.

ABNORMAL EXAMPLES (STOP & ISOLATE)



- Swollen or deformed battery.
- Stop charging immediately.
- Isolate in a safe area.



- Smoke, burning smell or gas.
- Turn off and disconnect.
- Move to a safe, ventilated area.



- Melted connector or cable.
- Do not use.
- Replace with proper parts.
- Check for other damage.



- Wet or soaked battery or charger.
- Stop charging.
- Disconnect and isolate.
- Follow OEM guidance for inspection.

WARNING

- Abnormal heat, smoke, gas, swelling or leakage can cause fire, explosion or serious injury.
- Do not touch hot, damaged or swollen batteries.
- Always follow the manufacturer's instructions.

NEXT STEP

- After shutdown and disconnection, follow the manufacturer's instructions for inspection, storage, repair or disposal.
- If there are signs of fire, gas, or serious damage — keep distance and seek professional support.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

I01 BATTERY FIRST LOOK — DAMAGE = REJECT

Visual rejection before use.

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

1. CHECK CASING



- No cracks, swelling, bulging or leaks.
- Casing must be intact.
- Reject if damaged, deformed or wet.

2. CHECK TERMINALS



- Terminals must be clean and solid.
- No serious corrosion, loose or damaged terminals.
- Reject if overheated, melted or broken.

3. CHECK FOR LEAKS OR SMELL



- No leaks, wet spots or crystal deposits.
- No unusual smell (acid, chemical, burnt).
- Reject if there is leakage, strong smell or signs of overheating.

KEY POINTS

- Do a visual check before using or charging.
- Reject if cracked, swollen, deformed or leaking.
- Check terminals and look for corrosion or heat damage.
- Check for wet spots, deposits or unusual smell.
- If there is any sign of damage – do not use, do not charge, and isolate safely.
- When in doubt, treat as unsafe and seek advice.

ACCEPTABLE EXAMPLES (GOOD CONDITION)



- Casing intact and flat.
- No swelling or cracks.
- Clean and dry.



- Clean terminals.
- No heavy corrosion.
- Solid connection.



- Intact case and label.
- No damage or leakage.
- Normal condition.

REJECT EXAMPLES (DO NOT USE)



- Swollen or bulging.
- Deformed casing.
- Do not use or charge.



- Severe corrosion.
- Loose or damaged terminal.
- Do not use.



- Cracks, leakage or wet.
- Signs of overheating or burn.
- Reject and isolate.

WARNING

- A damaged battery can leak, catch fire or explode.
- Do not use or charge if there are signs of damage, swelling, leakage or overheating.
- If unsure – isolate safely and seek advice.

NEXT STEP

- If the battery is in good condition, check the type and label (e.g. Flooded / AGM / GEL / EFB / Lithium) – go to I02.
- If damaged or abnormal – do not use, isolate and seek advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

102 LEAD-ACID TYPES & LABELS

Do not treat Flooded / AGM / GEL / EFB as identical.

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

1. FLOODED (STANDARD)



- Removable caps (cells).
- Needs maintenance (water).
- More venting during charge.
- Keep upright and ventilated.
- Check fluid level if accessible.

2. AGM (ABSORBENT GLASS MAT)



- Sealed, no water top-up.
- Lower venting, higher charge acceptance.
- Sensitive to overcharge.
- Use AGM-compatible charger.
- Common in modern vehicles.

3. GEL



- Sealed, gel electrolyte.
- Low venting, deep-cycle use.
- More sensitive to high voltage.
- Use GEL-compatible charger.
- Good for solar/off-grid storage.

KEY POINTS

- Identify the battery type before charging.
- Do not use a charger designed for a different type.
- Follow the manufacturer's label, voltage and charging profile.
- Flooded / AGM / GEL / EFB have different charging requirements.
- Do not modify the product, charger or cables.
- Keep in a safe, ventilated area.
- When in doubt, check the manual or seek advice.

COMMON LABELS (EXAMPLES)



- FLOODED / STD
- May have removable caps.
- Often marked 12V.



- AGM / VRLA
- Sealed, no top-up.
- Needs AGM charger.



- GEL
- Sealed, no top-up.
- Needs GEL charger.
- Often used for deep cycle.



- EFB
- Enhanced Flooded.
- Start-Stop vehicles.
- Use EFB/AGM charger as specified.

DO NOT MIX / WRONG CHARGER



- Using the wrong charger type.
- Can cause overcharge, heating or damage.



- Flooded charger on AGM/GEL/EFB.
- May cause overheating or reduced life.



- High voltage or wrong mode.
- Can damage the battery or create safety risk.

WARNING

- Different lead-acid batteries require different charging methods.
- Using the wrong charger can cause overheating, gas release, fire or explosion.
- Always follow the manufacturer's instructions.

NEXT STEP

- If you are unsure of the battery type, check the label or manual.
- Use the correct charger for Flooded / AGM / GEL / EFB.
- If the label is missing or unclear – do not charge and seek advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

103 LEAD-ACID — NO MATCHED CONTROLLER, NO BLIND CHARGE

AMBER
MEDIUM RISK
CAUTION REQUIRED
FOLLOW GUIDANCE

1. CHECK CONTROLLER TYPE



- Use a controller designed for lead-acid.
- Check supported types: Flooded / AGM / GEL / EFB.
- Follow the manufacturer's instructions.

2. VERIFY SETTINGS



- Select the correct battery type.
- Use the recommended voltage profile (Bulk / Absorb / Float).
- Do not use lithium settings.
- When in doubt, check the manual or seek advice.

3. CHECK COMPATIBILITY



- Controller and battery type must match.
- Do not use a controller for a different type (e.g. lithium).
- If unsure, do not charge. Seek professional or commercial

KEY POINTS

- Never blindly charge a lead-acid battery with an unknown or incompatible controller.
- Use a controller specifically designed for lead-acid (Flooded / AGM / GEL / EFB).
- Check and set the correct battery type and voltage profile.
- Do not use lithium, solar or general chargers that are not designed for lead-acid.
- An incorrect charger can cause overcharging, gas release, overheating, battery damage or fire.
- When in doubt, do not charge and seek advice.

MATCHED CONTROLLER (OK)



- Designed for lead-acid.
- Clear type labels.
- Use correct settings.
- As per manufacturer.



- Correct battery type selected.
- Correct voltage profile.
- Follow the manual.



- Controller and battery are a matched system.
- Safe and correct charging.
- Suitable for home/off-grid use.

WRONG CONTROLLER OR WRONG SETTINGS (DO NOT USE)



- Lithium charger on lead-acid battery.
- Wrong charge profile.
- Can cause damage, gas release or fire.



- General solar controller.
- No correct lead-acid profile.
- May not have proper voltage control.
- Do not use unless confirmed compatible.



- Unknown or unlabelled charger.
- Battery type and voltage unknown.
- Do not use. Seek advice.

WARNING

- Using the wrong controller can cause overcharging, gas release, overheating, battery damage or fire.
- Do not charge if the controller type or settings are unclear.
- Always follow the manufacturer's instructions.

NEXT STEP

- If you have a confirmed, matched lead-acid charging solution – go to 104.
- If unsure about the controller or battery type – do not charge and seek advice.
- For damaged or abnormal battery – follow 101 or 104.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

104 USED LEAD-ACID — REJECT SCREEN ONLY

Abnormal low voltage = uncertain state; do not diagnose bad cells or force recovery.

AMBER
MEDIUM RISK
CAUTION REQUIRED
FOLLOW GUIDANCE

1. SCREEN VOLTAGE ONLY



- Measure open-circuit voltage for a quick screen.
- Abnormally low voltage (<~10.5V for 12V) = uncertain state.
- Do not attempt to diagnose individual cells.

2. CHECK PHYSICAL CONDITION



- Look for swelling, cracks, leaks or deformation.
- Check terminals and casing condition.
- If damaged or abnormal, reject.

3. DO NOT FORCE RECOVERY



- Do not force charge or attempt to recover low-voltage batteries.
- Do not perform cell diagnosis or reconditioning.
- Treat as uncertain state and follow site procedure.

KEY POINTS

- Use this card for a quick screen only.
- Abnormal low voltage = uncertain state; do not diagnose bad cells or force recovery.
- Do not attempt to revive or recondition used lead-acid batteries.
- Check for physical damage (swelling, cracks, leaks, deformation).
- Keep in a safe, ventilated area.
- When in doubt, isolate and seek advice.

ACCEPTABLE EXAMPLES (FOR SCREEN ONLY)



- Normal voltage reading (e.g. ~12.6V for 12V).
- No swelling, leaks or cracks.
- Used for screening only (not for charging).



- Terminals intact and clean (no heavy corrosion).
- No deformation.
- Suitable for screen and further sorting.



- Case intact.
- No signs of leakage.
- Normal appearance.

REJECT EXAMPLES (DO NOT USE)



- Abnormally low voltage (e.g. <~10.5V for 12V).
- Treat as uncertain state.
- Do not charge or recover.



- Swollen or bulging case.
- Cracks or leakage.
- Do not use.
- Isolate and follow disposal procedure.



- Severe corrosion, leakage or damage.
- Do not use.
- Do not force charge.
- Seek advice.

WARNING

- Low-voltage lead-acid batteries are in an uncertain state.
- Do not force charge or attempt to recover.
- If damaged, leaking or abnormal – isolate safely and seek advice.

NEXT STEP

- If the battery passes the screen (normal voltage and condition),
- sort and follow the next card (e.g. 105).
- If abnormal, damaged or low voltage – do not use, isolate and seek advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

105 DO NOT RANDOMLY SERIES/PARALLEL USED BATTERIES

Do not combine different/unknown provenance and condition.

AMBER
MEDIUM RISK
CAUTION REQUIRED
FOLLOW GUIDANCE

ACCEPTABLE (MATCHED SET)



- Same brand, model and chemistry.
- Similar age and cycle count.
- Consistent state of health (SOH) and voltage.
- Use as a complete original pack or matched set.

DO NOT MIX DIFFERENT BRANDS



- AGM, GEL, Flooded and EFB have different charging requirements.
- Mixing can cause overcharge, gas release, overheating or fire.
- Do not series or parallel different brands or types.

DO NOT MIX DIFFERENT CONDITIONS



- Do not combine batteries with different age, capacity, or state of health.
- Uneven charging and discharging can cause overheating, swelling, leakage or fire.
- Do not use unknown provenance batteries.

KEY POINTS

- Do not randomly series or parallel used batteries.
- Only combine batteries with the same brand, model, type and similar condition.
- Different batteries have different internal resistance, capacity and charging profile.
- Mismatched batteries can cause overcharging, gas release, overheating, reduced life or fire.
- Use a complete vehicle or commercial solution when possible.
- When in doubt, do not combine and seek advice.

WRONG EXAMPLES (DO NOT USE)



- Different capacity (e.g. 100Ah + 50Ah).
- Causes uneven charging and discharging.
- Can lead to overheating, damage or reduced life.



- Different age or state of health.
- A newer battery may be overcharged by an older one.
- Increases risk of gas release, leakage or fire.



- Different chemistries (e.g. Lithium with AGM).
- Completely different charging profile and protection requirements.
- Can cause serious damage or fire.



- Different brands or models.
- Internal resistance and capacity may not match.
- Increases risk of overheating, gas release or fire.

WARNING

- Mismatched batteries can cause overcharging, gas release, overheating, battery damage or fire.
- Do not randomly series or parallel used batteries.
- Use only matched batteries or complete original packs.
- If unsure, do not combine and seek professional advice.

NEXT STEP

- Use a complete pack from the manufacturer when possible.
- Check the battery type, brand, model, age and condition.
- If you are unsure or cannot confirm compatibility – do not combine and seek advice.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

I06 LITHIUM — COMPLETE ORIGINAL PACKS ONLY

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE COMPLETE ORIGINAL PACKS



- Keep lithium batteries as complete, original packs.
- Use the original case, BMS and connectors.
- Choose intact, genuine products from known manufacturers.
- Use as per the manufacturer's instructions.

NO BARE-CELL SALVAGE



- Do not use bare cells or salvaged cells.
- Do not rebuild or modify battery packs.
- Do not bypass, remove or damage the BMS.
- Do not mix cells from different sources, brands or conditions.

WARNING

- Damaged, modified or mixed lithium batteries can cause overcharging, gas release, overheating, fire or explosion.
- Use only complete, genuine battery packs from recognised manufacturers.
- If unsure about the battery's condition – do not use and seek advice.

NEXT STEP

- Use complete products only (tools, power banks, OEM packs).
- Check the battery type, brand and condition.
- Follow the manufacturer's instructions.
- If damaged, swollen or altered – do not use and seek advice.

NZWAR
OFF-GRID POWER

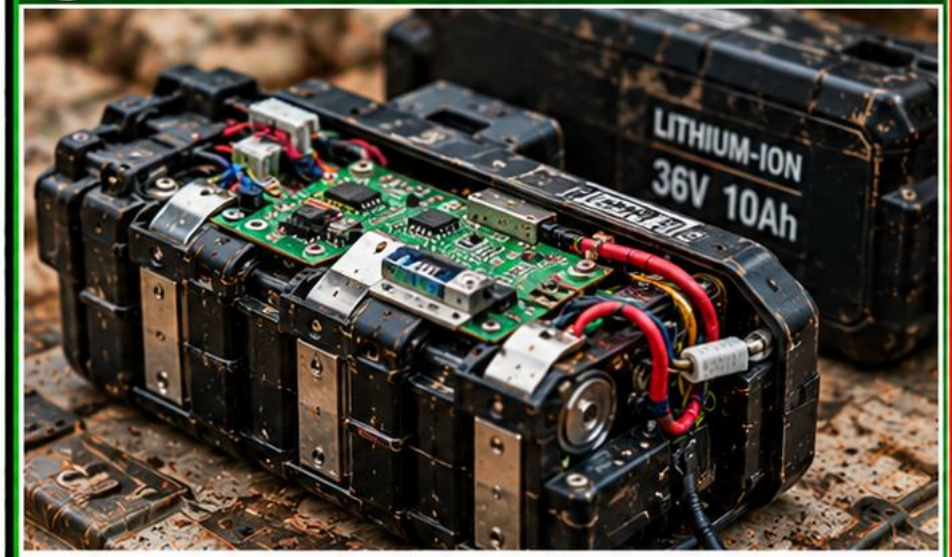
KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

107 LITHIUM — NO BMS BYPASS / FORCE CHARGE

RED
HIGH RISK
PROFESSIONAL ONLY
DO NOT ATTEMPT

USE ORIGINAL BMS AND PROPER CHARGING



- Use the battery pack as designed with its original BMS.
- Use a compatible charger and correct charge profile.
- Keep the BMS, wiring and protection systems intact.
- Follow the manufacturer's instructions.

DO NOT BYPASS BMS / FORCE CHARGE



- Do not bypass, remove or disable the BMS.
- Do not force charge or attempt to recover low-voltage packs.
- Do not disassemble or modify battery packs.
- Do not use unknown chargers or manual charging methods.

WARNING

- Bypassing the BMS or force charging can cause overcharging, gas release, overheating, fire or explosion.
- Public should not attempt cell-pack recovery.
- Leave damaged, swollen or abnormal packs and seek professional advice.

NEXT STEP

- Use complete, original battery packs only.
- If a pack is damaged, swollen or not charging normally – do not use.
- Seek professional or manufacturer support.
- Focus on safe, tested and compatible charging solutions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

108 DAMAGED LITHIUM — DISTANCE FIRST

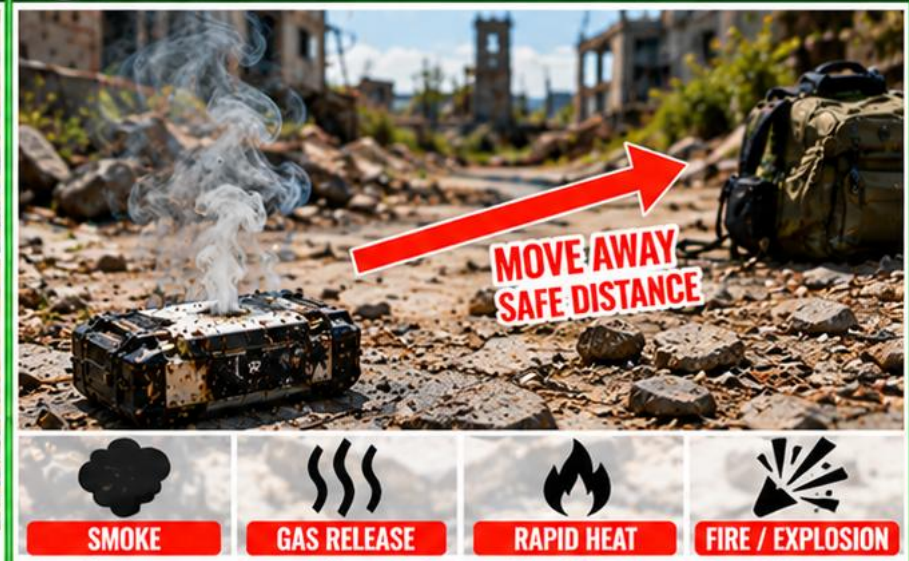
GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

RECOGNISE DAMAGED LITHIUM



- Look for swelling, cracks, leaks, deformation or burn marks.
- Treat any visible damage as a risk.
- Do not use damaged lithium batteries.
- Prepare to move away to a safe distance.

DISTANCE FIRST — MOVE AWAY



- If you see smoke, smell unusual odour, hear hissing or feel rapid heat – move away immediately.
- Keep others away and avoid enclosed spaces.
- Do not touch, move or attempt to cool the battery.
- Leave the area and seek emergency response if needed.

WARNING

- Damaged lithium batteries can overheat, release gas, catch fire or explode.
- Do not handle or attempt to repair damaged batteries.
- Move to a safe distance and keep others away.
- If unsure, treat as dangerous and seek advice.

NEXT STEP

- Move to a safe distance and monitor.
- Isolate the area if possible.
- Seek emergency response if there is smoke, fire or risk to others.
- Do not attempt to cool, open or repair.

109 COLD / WET BATTERIES — FOLLOW OEM LIMITS

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

COLD CONDITIONS

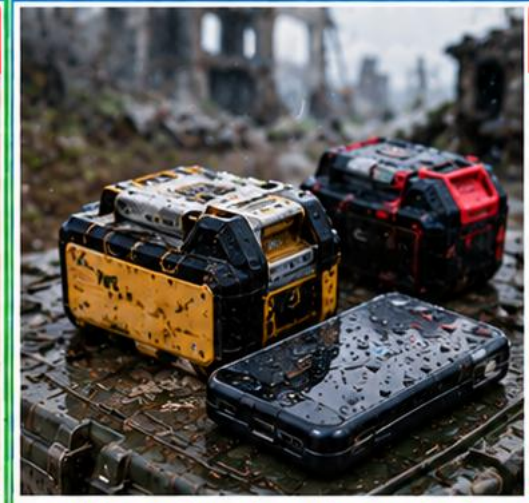


DO NOT BLIND-CHARGE



- Cold batteries will not charge normally and may be damaged.
- Do not charge outside the manufacturer's temperature range.
- Allow the battery to warm to a suitable temperature naturally.
- Check for moisture, damage or abnormal condition.
- Follow the manufacturer's instructions.

WET CONDITIONS



DO NOT BLIND-CHARGE



- Wet or damp batteries can be dangerous.
- Do not charge batteries that are wet or have been submerged.
- Dry the external surface and allow to fully dry in a safe area.
- Check for signs of water ingress, damage or corrosion.
- Only charge when the battery is dry, intact and within OEM limits.

WARNING

- Charging cold or wet batteries can cause damage, overheating, gas release, fire or explosion.
- Do not use or charge batteries outside the manufacturer's temperature and environmental limits.
- If unsure, do not use and seek professional advice.

NEXT STEP

- Check the battery type, brand and condition.
- Allow cold batteries to warm to a suitable temperature.
- Ensure batteries are completely dry before charging.
- Use a compatible charger and follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

I10 BATTERY TEMPERATURE — ABNORMAL TREND = STOP

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

NORMAL — STABLE TEMPERATURE



- Monitor temperature during use and charging.
- A stable, normal temperature trend is expected.
- Use as intended and within the manufacturer's limits.
- Check for signs of heat, swelling or abnormal odour.

ABNORMAL TREND



- Temperature rising quickly or higher than usual.
- Unusual heat during charge or use.
- Hot spots, uneven heating.
- Swelling, odour or other changes.

ABNORMAL TREND = STOP



- If temperature trend is abnormal — STOP.
- Do not continue to use or charge.
- Move the battery to a safe area away from people and flammable materials.
- Do not rely on hand feel — it does not prove safety.
- Follow the manufacturer's instructions.

WARNING

- Overheating lithium batteries can release gas, catch fire or explode.
- Abnormal temperature trend is a sign of potential failure.
- Do not ignore heat, swelling, smell or other warning signs.
- If unsure, stop using and seek professional advice.

NEXT STEP

- Stop using if the temperature trend is abnormal.
- Move to a safe, non-flammable area and monitor.
- Do not charge again until the battery has cooled and been checked.
- Follow the manufacturer's instructions or seek professional support.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J01 LOAD PRIORITY — COMMS → NAVIGATION → LIGHT

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

1 COMMS



EMERGENCY COMMUNICATION
STAY INFORMED
CALL FOR HELP

2 NAVIGATION



FIND SAFE ROUTE
AVOID HAZARDS
REACH SUPPLIES

3 LIGHT



ESSENTIAL LIGHTING
SAFE MOVEMENT
WORK AT NIGHT

LOW PRIORITY / AVOID



HEATING LOADS
HIGH POWER USE



COOKING APPLIANCES
HIGH POWER USE



POWER TOOLS
NON-ESSENTIAL USE

- Use available power for critical tasks: communications, navigation and lighting.
- Avoid wasting scarce power on heating-type loads and non-essential appliances.
- Turn on devices only when needed.
- Use low power modes and efficient equipment.
- Keep devices charged and ready for when they are needed.

WARNING

- Power is limited and may be difficult to replace.
- Non-essential loads can quickly drain batteries.
- Do not waste power on heating, high-power tools or luxury appliances.
- Keep critical devices charged and functional.

NEXT STEP

- Identify what you really need powered.
- Prioritise: comms → navigation → light.
- Use efficient, low-power devices.
- Keep non-essential loads off.
- Plan your power use for the next stage.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J02 USB — PREFER COMPLETE COMMERCIAL CAR/POWER MODULES

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE COMPLETE COMMERCIAL MODULES



COMPLETE CAR USB CHARGER OR POWER MODULE


COMPLETE POWER MODULE WITH ORIGINAL INTERFACE



IN-VEHICLE USB POWER MODULE


PREFER INTACT, ENCLOSED UNITS

- Use complete, commercially made car or power modules.
- Keep the original enclosure, protection and connectors.
- Ensure the input range matches your power source (e.g. 12V vehicle system).
- Use as intended by the manufacturer.

AVOID DIY OR INCOMPLETE USB MODULES


DO NOT USE BARE BOARDS


DO NOT MAKE DIY USB OUTPUTS


DO NOT USE DAMAGED OR OPEN UNITS


DO NOT MODIFY OR REWIRE

- Do not use bare USB boards or partially disassembled chargers.
- Do not make DIY USB outputs or modify commercial modules.
- Do not bypass built-in protection circuits.
- Do not use damaged, incomplete or unprotected units.

WARNING

- Improper or DIY USB power modules can overheat, fail or cause fire.
- Use only complete, commercially made modules.
- Ensure the input voltage matches your power source.
- If unsure, do not use and seek professional advice.

NEXT STEP

- Check the input voltage range (e.g. 12V).
- Use intact, enclosed, commercial modules.
- Verify connectors and cables are in good condition.
- Ensure the module is suitable for your intended devices.
- Follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J03 USB-C / PD — NO DIY PROTOCOL WIRING

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE COMPLIANT CHARGERS AND CABLES



CERTIFIED USB-C CABLE
(E-MARKED FOR HIGHER POWER)



USB PD CHARGER
(COMPLIANT PRODUCT)



POWER BANK WITH USB PD


USE WITH COMPATIBLE DEVICES

- Use compliant USB-C PD chargers, cables and devices.
- Use E-Marked cables for higher power (e.g. 60W/100W).
- Ensure devices support the required PD standard.
- Keep connectors clean, dry and undamaged.
- Follow the manufacturer's instructions.

DO NOT DIY USB-C / PD WIRING


DO NOT MAKE DIY USB-C CABLES


DO NOT MODIFY CONNECTORS


DO NOT BYPASS PD PROTOCOL


DO NOT USE UNKNOWN WIRING

- Do not make DIY USB-C or PD protocol wiring.
- Do not modify chargers, cables or connectors.
- Do not bypass or fake PD protocol circuits.
- Do not use unknown or non-compliant cables.
- Improper wiring can damage devices, cause overheating or fire.

WARNING

- USB-C PD uses a communication protocol (not just power).
- DIY wiring can damage devices, cause overheating or fire.
- Use only compliant, certified products from trusted sources.
- If unsure, do not use and seek professional advice.

NEXT STEP

- Use certified USB-C PD chargers and E-Marked cables.
- Check the power rating matches your device (e.g. 18W/45W/65W/100W).
- Keep spare cables and chargers in good condition.
- If a cable or charger is damaged, replace it.
- Follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J04 PHONE CHARGING — VERIFY THE SOURCE FIRST

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE TRUSTED POWER SOURCES


HOME / KNOWN SOURCE
SAFE TO USE


VEHICLE 12V / KNOWN SOURCE
GENERALLY SAFE


YOUR OWN POWER BANK
USE AND MAINTAIN PROPERLY


YOLAR PANEL / KNOWN EQUIPMENT
SAFE WHEN IN GOOD CONDITION

- Use trusted power sources: home, your own vehicle, your own power bank or known solar equipment.
- Check that cables and chargers are in good condition.
- Keep equipment clean, dry and undamaged.
- Use original or certified chargers when possible.
- Turn on the phone only when needed and use low power mode.

AVOID UNKNOWN OR UNTRUSTED SOURCES


DO NOT USE PUBLIC USB PORTS
(e.g. airports, malls, stations)


DO NOT CONNECT TO UNKNOWN
COMPUTERS OR DEVICES


DO NOT USE UNKNOWN
OR LOW QUALITY CHARGERS


DO NOT MAKE DIY CHARGERS
OR MODIFY WIRING

- Do not use public USB charging ports (data theft or malware risk).
- Do not connect to unknown computers or devices.
- Do not use unidentified, low quality or damaged chargers and cables.
- Do not make DIY chargers or modify existing chargers.
- Do not leave the phone unattended while charging in public places.
- The phone is not a test instrument.

WARNING

- Unknown or tampered charging sources can cause data theft,
- malware infection, battery damage, overheating or fire.
- Avoid using public USB ports.
- Do not use damaged chargers, cables or makeshift wiring.
- If unsure, do not use and seek professional advice.

NEXT STEP

- Use trusted and confirmed power sources only.
- Keep spare cables and a known charger.
- Check cables and chargers regularly.
- Charge only when needed and monitor for heat.
- Follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J05 12V LIGHTING – LOW CONSUMPTION FIRST

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE LOW POWER, EFFICIENT LIGHTING



LED HEADLAMP
HANDS FREE, LOW POWER



LED LANTERN
AREA LIGHTING, LOW POWER



LED STRIP (12V)
EFFICIENT, LONG RUNTIME



12V LED WORKLIGHT
HIGH OUTPUT WHEN NEEDED

- Use LED lighting whenever possible.
- Choose low power, efficient lights suitable for 12V systems.
- Use the lowest brightness that meets your need.
- Turn off lights when not in use.
- Plan lighting use to conserve battery power for essential tasks.

AVOID HIGH POWER OR INEFFICIENT LIGHTING



DO NOT USE HALOGEN LIGHTS
HIGH POWER, DRAINS BATTERY FAST



DO NOT USE INCANDESCENT BULBS
VERY INEFFICIENT, HIGH POWER USE



DO NOT USE DECORATIVE LIGHTS
HIGH CONSUMPTION, NON-ESSENTIAL



DO NOT USE HIGH POWER LIGHT BARS
UNNECESSARY POWER CONSUMPTION

- Avoid halogen, incandescent or other high power, inefficient lights.
- Do not use decorative or non-essential lighting.
- Do not leave lights on when not needed.
- Avoid permanently installed high power light bars unless essential.
- Use lighting only for safety and necessary tasks.

WARNING

- High power lights can quickly drain your battery.
- Increased power use reduces available power for essential tasks (communications, navigation, medical, etc.).
- Lights can also generate heat and may pose a fire risk.
- Use lighting responsibly and only as needed.

NEXT STEP

- Choose and prepare low power 12V LED lighting options.
- Test your lighting before you need it.
- Keep spare bulbs/lanterns and check connections regularly.
- Plan your power use to put safety and essential tasks first.
- Follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

J06 RADIO / COMMS — SAVE POWER BY MISSION

GREEN
LOW RISK
PUBLIC ACTION
SAFE TO FOLLOW

USE RADIO POWER ONLY WHEN NEEDED



TURN ON ONLY WHEN NEEDED



USE LOW POWER MODE


KEEP TRANSMISSIONS SHORT AND CLEAR


KEEP BATTERIES CHARGED FOR IMPORTANT COMMS

- Turn on radios only when you need to communicate.
- Use low power mode where suitable.
- Keep transmissions short, clear and to the point.
- Save battery power for critical communication.
- Keep spare batteries charged and ready.

AVOID UNNECESSARY TRANSMISSION


DO NOT TRANSMIT UNNECESSARILY


DO NOT LEAVE RADIO ON CONTINUOUSLY


DO NOT USE HIGH POWER UNLESS NECESSARY


DO NOT MAKE LONG OR UNNECESSARY CHAT

- Do not transmit if it is not necessary.
- Do not leave the radio on continuously.
- Avoid high power output unless required for range or safety.
- Do not make long or unnecessary chat transmissions.
- Avoid repeated calls that waste battery power.

WARNING

- Unnecessary transmission wastes battery power and may reduce critical communication capability.
- High power transmission shortens operating time and can overheat the radio.
- Keep communication disciplined, especially in emergency situations.
- Follow local regulations and authorised communication procedures.

NEXT STEP

- Pre-plan your communication needs.
- Set appropriate channels and low power mode.
- Check battery level and carry spares or charging options (e.g. 12V, solar, power bank).
- Practice short, clear and standard message format.
- Follow local rules and team communication plan.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

K01 INVERTER — OUTDOOR / DRY / STANDALONE / DIRECT LOAD ONLY

AMBER
MEDIUM RISK
TRAINING RECOMMENDED
USE WITH CAUTION

USE A COMPLETE COMMERCIAL INVERTER (OUTDOOR / DRY)


USE COMPLETE, COMMERCIAL INVERTERS


KEEP OUTDOORS AND DRY


POWER STANDALONE, PORTABLE LOADS ONLY



CHECK RATED CAPACITY MATCHES YOUR LOAD

- Use a complete, commercially made inverter.
- Place on a stable surface, outdoors and keep it dry.
- Use for portable, standalone loads only (e.g. laptop, fan, lights).
- Check the rated power capacity matches your devices.
- Use as intended by the manufacturer and follow instructions.

DO NOT USE INVERTERS IN UNSAFE WAYS


DO NOT CONNECT TO BUILDING WIRING


DO NOT USE IN WET CONDITIONS


DO NOT OPEN OR MODIFY THE INVERTER


DO NOT POWER HIGH LOAD OR FIXED APPLIANCES

- Do not connect an inverter to house or building wiring.
- Do not use in rain, wet environments or damp locations.
- Do not open, modify or repair the inverter.
- Do not power fixed household appliances or high continuous loads.
- Do not use homemade or non-compliant inverters.

WARNING

- Improper use can cause electric shock, fire, damage to equipment or serious injury.
- Inverters are for portable, standalone use only.
- Keep dry, well ventilated and away from flammable materials.
- If unsure, do not use and seek professional advice.

NEXT STEP

- Confirm you have a complete, compliant inverter.
- Choose a dry, well ventilated outdoor location.
- Check the inverter's rated power and your device requirements.
- Inspect cables and connections before use.
- Follow the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

K02 NEVER CONNECT AN INVERTER TO BUILDING WIRING

RED
HIGH RISK
PROFESSIONAL ONLY
PUBLIC PROHIBITION

USE INVERTERS ONLY FOR STANDALONE / PORTABLE LOADS



USE FOR PORTABLE APPLIANCES ONLY
(e.g. fridge, laptop, fan, tools)



KEEP AS A STANDALONE SYSTEM
OUTDOORS AND DRY



CHECK RATED CAPACITY
MATCHES YOUR LOAD



USE PROPER CABLES AND PLUGS
IN GOOD CONDITION

- Use inverter for standalone, portable loads only.
- Keep the inverter outside or in a well-ventilated, dry area.
- Check the rated power and ensure it meets your device requirements.
- Use proper cables and plugs, and keep them in good condition.
- Follow the manufacturer's instructions.

DO NOT CONNECT TO BUILDING WIRING



DO NOT CONNECT TO HOUSE
OR BUILDING WIRING



DO NOT BACKFEED
INTO A POWER OUTLET



DO NOT MODIFY BUILDING WIRING
OR SWITCHBOARDS



DO NOT USE TO POWER
A HOUSE OR BUILDING

- Do not connect an inverter to house or building wiring.
- Do not backfeed electricity into any power outlet.
- Do not modify switchboards, circuits or wiring.
- Do not use an inverter to power a house, building or fixed appliances.
- This can cause electric shock, fire, damage to equipment and risk to others.

WARNING

- Backfeeding can put power into the public grid.
- It can cause electric shock, fire, serious injury or death.
- It can damage your inverter, household appliances and the grid.
- Building wiring must only be installed or modified by a licensed professional.
- For public safety, never connect an inverter to building wiring.

NEXT STEP

- Keep the inverter as a standalone portable system.
- Use it only for your own devices and appliances.
- If you need to power a house or building, consult a qualified and
- licensed electrician for a compliant system.
- Follow local regulations and the manufacturer's instructions.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

K03 INVERTER EARTHING / RCD — MANUFACTURER DESIGN ONLY

RED
HIGH RISK
PROFESSIONAL ONLY
NO DIY MODIFICATIONS

FOLLOW MANUFACTURER DESIGN AND INSTRUCTIONS


USE MANUFACTURER GROUND/EARTH CONNECTION ONLY



USE BUILT-IN RCD (IF PROVIDED) FOLLOW MANUFACTURER SPEC


FOLLOW MANUFACTURER EARTHING REQUIREMENTS



READ AND FOLLOW THE MANUFACTURER'S MANUAL

- Use the inverter's factory-designed earthing/ground connection.
- Use built-in RCD protection if provided and follow the manual.
- Follow the manufacturer's installation requirements.
- Keep all earthing connections secure, clean and in good condition.
- Have installation and compliance checked by a licensed professional if required.

DO NOT MODIFY EARTHING OR RCD


DO NOT MODIFY, REMOVE OR BYPASS EARTH/GROUND WIRING



DO NOT MODIFY, DISABLE OR BYPASS RCD PROTECTION


DO NOT CONNECT TO BUILDING NEUTRAL/EARTH SYSTEM


DO NOT OPEN OR MODIFY INTERNAL EARTHING / RCD CIRCUITS

- Do not modify, remove or bypass earth/ground wiring.
- Do not modify, disable or bypass RCD protection.
- Do not connect the inverter to building neutral, earth or existing wiring.
- Do not open or alter internal earthing or RCD circuits.
- Do not attempt DIY earthing/ground modifications.
- This work must be done by a qualified and licensed professional.

WARNING

- Incorrect earthing or RCD configuration can cause electric shock, fire, serious injury or death.
- Inverter earthing, RCD and connection to building wiring must follow the manufacturer's design and local electrical regulations.
- This card does not provide installation instructions.
- For any doubt, consult a qualified and licensed electrician.

NEXT STEP

- Read the inverter manual for earthing/RCD requirements.
- Use only manufacturer-approved configuration.
- If connection to a building or fixed installation is needed, engage a qualified and licensed electrician.
- Do not proceed without proper knowledge and authority.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

K04 SYSTEM ASSEMBLY – CHECK SOURCE TO LOAD, ONE STAGE AT A TIME

AMBER
MEDIUM RISK
TRAINING RECOMMENDED
USE WITH CAUTION

ASSEMBLE AND VERIFY ONE STAGE AT A TIME



1. CHECK INPUT SOURCE
(e.g. solar panel, battery)



2. CONNECT TO INVERTER
(follow manual)



3. ADD PROTECTION
(fuse / breaker as required)



4. CONNECT LOAD
(one device at a time and test)

- Assemble the system step by step: source → inverter → protection → load.
- Check each stage is correct before adding the next stage.
- Use correct cables, fuses/breakers and connectors.
- Verify voltage/polarity and settings before connecting loads.
- Follow the manufacturer's instructions and your system design.

AVOID COMMON ASSEMBLY MISTAKES



DO NOT CONNECT EVERYTHING AT ONCE



DO NOT REVERSE POLARITY



DO NOT SKIP FUSE / BREAKER OR PROTECTION



DO NOT CONNECT HIGH POWER LOADS WITHOUT CHECKING CAPACITY

- Do not connect all components at once.
- Do not reverse polarity or make incorrect connections.
- Do not skip required fuses, breakers or protection devices.
- Do not connect high power or multiple loads without checking capacity.
- Do not use undersized cables, damaged connectors or non-compliant parts.

WARNING

- Incorrect assembly can cause fire, equipment damage, serious injury or death.
- Follow the correct sequence and verify each stage.
- Use only properly rated and compliant components.
- If you are not trained or unsure, seek advice from a qualified person.

NEXT STEP

- Plan your system design (source, inverter, protection, load).
- Install and check one stage at a time.
- Verify settings, voltage and polarity before connecting loads.
- Test with a small, low-power device first.
- Follow the manufacturer's instructions and local regulations.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

K05 TROUBLESHOOT — CHANGE ONE VARIABLE AT A TIME

AMBER
MEDIUM RISK
TRAINING RECOMMENDED
USE WITH CAUTION

CHANGE ONE VARIABLE AT A TIME



1. CHECK AND RECORD
(voltage, status, fault code)



2. CHANGE ONE VARIABLE
(e.g. disconnect one cable)



3. WAIT AND OBSERVE
(check status, error code, output)



4. RECORD THE RESULT
(then decide next step)

- Change only one variable at a time.
- Record settings, measurements and fault codes before and after each change.
- Follow the manufacturer's troubleshooting guide.
- Allow time for the system to stabilise and observe the result.
- If unsure, stop and seek advice from a qualified person.

DO NOT CHANGE MULTIPLE THINGS AT ONCE



DO NOT CHANGE MULTIPLE CABLES OR SETTINGS AT ONCE



DO NOT CHANGE MANY SETTINGS AT THE SAME TIME



DO NOT IGNORE FAULT CODES OR WARNING SIGNS



DO NOT USE UNAPPROVED OR HOMEMADE MODIFICATIONS

- Do not change multiple cables, settings or components at once.
- Do not ignore fault codes, alarms or abnormal behaviour.
- Do not use unapproved or homemade modifications.
- Do not continue testing if you see signs of overheating, unusual noise, smell or damage.
- Do not proceed beyond basic checks if you are not trained.

WARNING

- Incorrect troubleshooting can cause electric shock, fire, equipment damage or system failure.
- Always de-energise before changing wiring or major components.
- Follow the correct procedure and manufacturer's instructions.
- If unsure, seek advice for a qualified and licensed person.

NEXT STEP

- If the issue continues, check the next component.
- Recheck all connections and settings.
- Consult the manufacturer's troubleshooting guide.
- If the problem cannot be resolved, contact a qualified and licensed technician.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

KO6 FINAL PACK-DOWN — ISOLATE SAFELY

GREEN
LOW RISK
GENERAL USE
FOLLOW STANDARD PROCEDURE

STOP ENERGY AND ISOLATE SAFELY



1. DISCONNECT INPUT SOURCE
(solar panel / battery / generator)



2. TURN OFF INVERTER
and allow shutdown



3. DISCONNECT BATTERY
(remove negative first)



4. PACK AND STORE
(keep cables secure and clean)

- Stop energy input and isolate all sources in the correct order.
- Follow the manufacturer's shutdown and disconnect instructions.
- Ensure nothing is live or rotating.
- Check that all cables and connectors are disconnected and secured.
- Pack equipment properly, keep cables clean and protected.
- Confirm the system is safe before moving or storing.

DO NOT LEAVE ANYTHING LIVE OR ROTATING



DO NOT LEAVE PANELS CONNECTED
OR GENERATING POWER



DO NOT LEAVE INVERTER
POWERED ON



DO NOT LEAVE BATTERY CONNECTED



DO NOT LEAVE LOOSE CABLES
OR EXPOSED CONNECTORS

- Do not leave any part of the system live or generating power.
- Do not leave the inverter powered on.
- Do not leave the battery connected.
- Do not leave loose or exposed cables and connectors.
- Do not move or pack equipment until it is fully isolated.
- Do not assume the system is safe — always follow the correct procedure.

WARNING

- Live power can cause electric shock, fire, serious injury or death.
- Always de-energise and isolate before moving, packing or storage.
- Follow the manufacturer's instructions and correct disconnect order.
- Do not rely on switches or indicators alone.
- If unsure, seek advice from a qualified and licensed person.

END

- All sources disconnected.
- Inverter off and fully shut down.
- Cables and connectors packed and secured.
- System is safe to move or store.
- Ready for transport or next use.

NZWAR
OFF-GRID POWER

KNOW THE RISKS. STAY SAFE. KEEP POWER FOR LIFE.

PREPARE
ADAPT
SURVIVE

BINDING HOLE AREA
10 mm — DO NOT PLACE IMPORTANT CONTENT
10 mm

SALVAGE POWER

EMERGENCY USE / DISCLAIMER / SCOPE

AMBER
MEDIUM RISK
READ AND UNDERSTAND
BEFORE PROCEEDING

WHAT THIS HANDBOOK IS FOR

Practical guidance for using salvaged and second-hand equipment to build **basic, low-power off-grid electricity for survival** in war, infrastructure collapse, prolonged outage, evacuation or genuine wilderness conditions.

WHAT THIS HANDBOOK IS NOT FOR

Not for normal household use, commercial electrical work, paid work, product manufacture or certification. Not a guide to modify fixed building wiring. **Not for powering household appliances** such as air conditioners, refrigerators, TVs or computers.

WHEN NORMAL OPTIONS EXIST

In peacetime, or when safe and compliant equipment and professional services are reasonably available, **buy and use proper equipment.** Salvage power is a survival fallback – not a cheaper substitute for normal equipment.

KEY LIMITS AND RISKS

Salvaged and improvised systems can be dangerous, unreliable and may cause fire, injury or death. Follow local law, manufacturer instructions and professional advice. If the source, voltage or equipment condition cannot be safely established, **stop.**

DO NOT CONNECT HOUSEHOLD APPLIANCES OR BUILDING WIRING TO AN IMPROVISED SALVAGE POWER SYSTEM.

THE GOAL IS NOT COMFORT.
THE GOAL IS ENOUGH POWER TO COMMUNICATE, SEE AND SURVIVE.