RUFF & TUFF

ELECTRIC VEHICLES

OWNERS MANUAL

Ruff & Tuff Electric Vehicles, Inc.

1 Ruff & Tuff Drive Winnsboro, South Carolina 29180 800-997-3547

Owner's Manual, Safety Guide, and Warranty Information

Electric Vehicles

NEV-2
NEV-4
CEV-2
CLX-2
CLX-4
4x4

Revision Date: Jan 15, 2009

Notes

Thank you for purchasing a Ruff & Tuff Electric Vehicle! This manual is designed to provide you with a basic understanding of the features and operation of this vehicle.

Included in this manual:

- Important Safety Information
- Basic operation, maintenance and inspection procedures.
- Information about special techniques and skills needed to ride your Ruff & Tuff electric vehicle.
- Warranty Information

For your safety:

- Read this manual carefully and completely before operating your vehicle. Make sure you understand all instructions.
- Take special notice of warning and caution labels on the vehicle.
- Only operate a Ruff & Tuff electric vehicle with proper training or instruction.
- Operators should have a valid motor vehicle license.
- No one under 16 years of age should operate a Ruff & Tuff electric vehicle.

Table of Contents

General Information

This guide is provided to assist the owner or operator of this Ruff & Tuff product in the safe operation and maintenance of the vehicle.

Operating Instructions

1) Make sure only responsible drivers operate this vehicle. Operators should have a valid motor vehicle license. No one under 16 years of age should be allowed to operate the vehicle.
2) Vehicle must be properly maintained in order to insure safe operating condition.
3) The operator of the vehicle should follow all applicable driving rules, regulations, and restrictions.
4) Reduce speed when making sharp turns and when traveling:
    a. In wet areas
    b. In blind spots
    c. Along loose terrain
    d. On uneven roads
    e. In traffic with other vehicles
    f. Near pedestrian areas
5) When parking vehicle:
    a. Apply Park Brake
    b. Move Forward/Reverse switch to “Neutral” position
    c. Turn key to “Off” position

Maintenance

If the owner of this Ruff & Tuff electric vehicle is not skilled, experienced, or capable of performing maintenance to the vehicle, he or she is encouraged to seek assistance to prevent injury to himself/ herself or damage to the vehicle.

In order to keep your Ruff & Tuff electric vehicle in the safest, most reliable condition, periodic maintenance should begin at purchase:

1) Ruff & Tuff Electric Vehicles, Inc. recommends that a qualified maintenance/repair dealer perform all maintenance and repairs.
2) Vehicle must be disabled before performing maintenance:
    a. Apply Park Brake
    b. Move Forward/Reverse switch to “Neutral” position
    c. Turn key to “Off” position
3) Replace all safety and warning labels on the vehicle that become damaged or missing.
4) Periodically check nuts and bolts around the vehicle to ensure they are not loose.
5) Test drive the vehicle after maintenance is performed or repairs are made.
6) Use wheel chocks and jack stands when lifting the vehicle.
7) Use proper tools when performing maintenance or repairs to the vehicle.
8) Battery Maintenance - There is no routine maintenance required in the battery compartment other than checking battery nuts periodically. Your AGM dry cell batteries do **not** require routine maintenance such as watering, etc. These batteries are virtually maintenance free.

9) Brake Maintenance - Disc brake pads should be visually inspected periodically and should be changed when the minimum pad thickness is reached by a certified Ruff & Tuff technician.
10) Tire Maintenance - Tire care is basic. Keep tires clean and use tire care products as needed. Refer to manufacturer's recommended inflation pressure located on the tire sidewall.
11) Replacement parts are available from your local Ruff & Tuff dealer. For best performance and safety, use only factory replacement parts.
12) Ruff & Tuff Electric Vehicles, Inc. recommends that you keep records of all maintenance and repairs.

Cleaning

1) Turn the key to the OFF position and remove before washing the vehicle.
2) Wash with soap and water. All parts of vehicle can be hosed off including battery terminals. Be sure to run the car after washing as the brakes may lock up if car is left to sit in place.
3) Do not concentrate water stream in location of the black box located in the center of the battery box. This is where the controller and electronics are located in your vehicle.
4) Paint should be waxed yearly to prevent fading due to extreme exposure to sunlight.

General Do's & Don'ts

Auxiliary Components
All 12V electrical components must be wired through the DC/DC converter. Precaution must be taken not to exceed the maximum rated output of the converter.

Cleaning
Moving parts kept clean of mud, sand and debris will typically last longer with less wear to the components. Example: Brakes that are constantly caked with mud are prone to much more rapid wear and much less effective stopping power.

Creeping
When RTEV units are driven very slowly at a constant throttle setting for extended periods (2-3 minutes plus), especially up hills, the motor will get excessively hot and cause damage to the motor, wires and possibly the controller. Electric motors are designed to spin, therefore when a motor is heavily loaded and turning slowly the excess amperage that is not used for motion is turned into heat. In any situation, the faster the motor is turning the more amperage is used up in motion and less heat buildup will occur.

Long Term Storage
When leaving an RTEV unit for an extended period, the batteries should be fully charged prior to storage. Leaving the batteries in a discharged state for extended periods will dramatically shorten the life and performance of the batteries.

Off Road Use
Any damage caused by debris such as rocks, sticks, logs, stumps, water, etc. is the responsibility of the operator. As always, use caution and common sense when operating off road.

Resting On Hills
When coming to rest on hills, you must never use the accelerator to keep the car motionless on hills. This should always be done with the braking system, removing your foot from the accelerator pedal. Even with light pressure on the accelerator, if amperage is sent through the motor and the load prevents the motor from turning the current will burn both the brushes and the surface of the armature upon which the brushes ride.

Specifications

Model: NEV2

Weight	1350 lbs. / 612.34 kg
Load Capacity	800 lbs. / 362.87 kg
Dimensions (LWH)	100”/50”/73”
Tires (4-ply)	Duro® 215/40-12
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	Dual rear mechanical drum brakes, self-adjusting, automatic park brake release
Front Suspension	Heavy duty leaf springs with hydraulic shock absorbers
Rear Suspension	Heavy duty leaf springs with hydraulic shock absorbers
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 3.8W 48 Volt DC/5.1 HP nominal/ 16 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 170 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 400-Amp output
Speed	20-25 mph / 32 -40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC output

Specifications

Model: NEV4

Weight	1385 lbs. / 628.23 kg
Load Capacity	1000 lbs. / 453.59 kg
Dimensions (LWH)	132”/50”73”
Tires (4-ply)	Duro® 215/40-12
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	Dual rear mechanical drum brakes, self-adjusting, automatic park brake release
Front Suspension	Heavy duty leaf springs with hydraulic shock absorbers
Rear Suspension	Heavy duty leaf springs with hydraulic shock absorbers
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 3.8W 48 Volt DC/5.1 HP nominal 16 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 170 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 400-Amp output
Speed	20-25 mph / 32-40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC output

Specifications

Model: CEV2

Weight	1350 lbs. / 612.34 kg
Load Capacity	800 lbs. / 362.87 kg
Dimensions (LWH)	100”/50”/80”
Tires (4-ply)	Duro® 23” x 10.5” x 12”
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	Dual rear mechanical drum brakes, self-adjusting, automatic park brake release
Front Suspension	Independent heavy duty coil over springs with hydraulic shock absorbers
Rear Suspension	Heavy duty leaf springs with hydraulic shock absorbers
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 3.8W 48 Volt DC/5.1 HP nominal 16 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 170 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 400-Amp output
Speed	20-25 mph / 32-40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC Output

Specifications

Model: CLX2

Weight	1590 lbs. / 721.21 kg
Load Capacity	800 lbs. / 362.87 kg
Dimensions (LWH)	100”/50”/80”
Tires (4-ply)	Duro® 23” x 10.5” x 12”
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	4-Wheel Hydraulic Disc Brakes
Front Suspension	Independent heavy duty coil over springs with hydraulic shock absorbers
Rear Suspension	Independent with dual a-arms and coil over shocks
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 4.4KW 48 Volt DC/5.9 HP nominal/19 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 230 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 500-Amp output
Speed	20-25 mph / 32-40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC output

Specifications

Model: CLX4

Weight	1625 lbs. / 737.08 kg
Load Capacity	1000 lbs. / 453.59 kg
Dimensions (LWH)	132”/50”/80”
Tires (4-ply)	Duro® 23” x 10.5” x 12”
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	4-Wheel Hydraulic Disc Brakes
Front Suspension	Independent heavy duty coil over springs with hydraulic shock absorbers
Rear Suspension	Independent with dual a-arms and coil over shocks
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 4.4KW 48 Volt DC/5.9 HP nominal/ 19 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 230 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 500-Amp output
Speed	20-25 mph / 32-40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC output

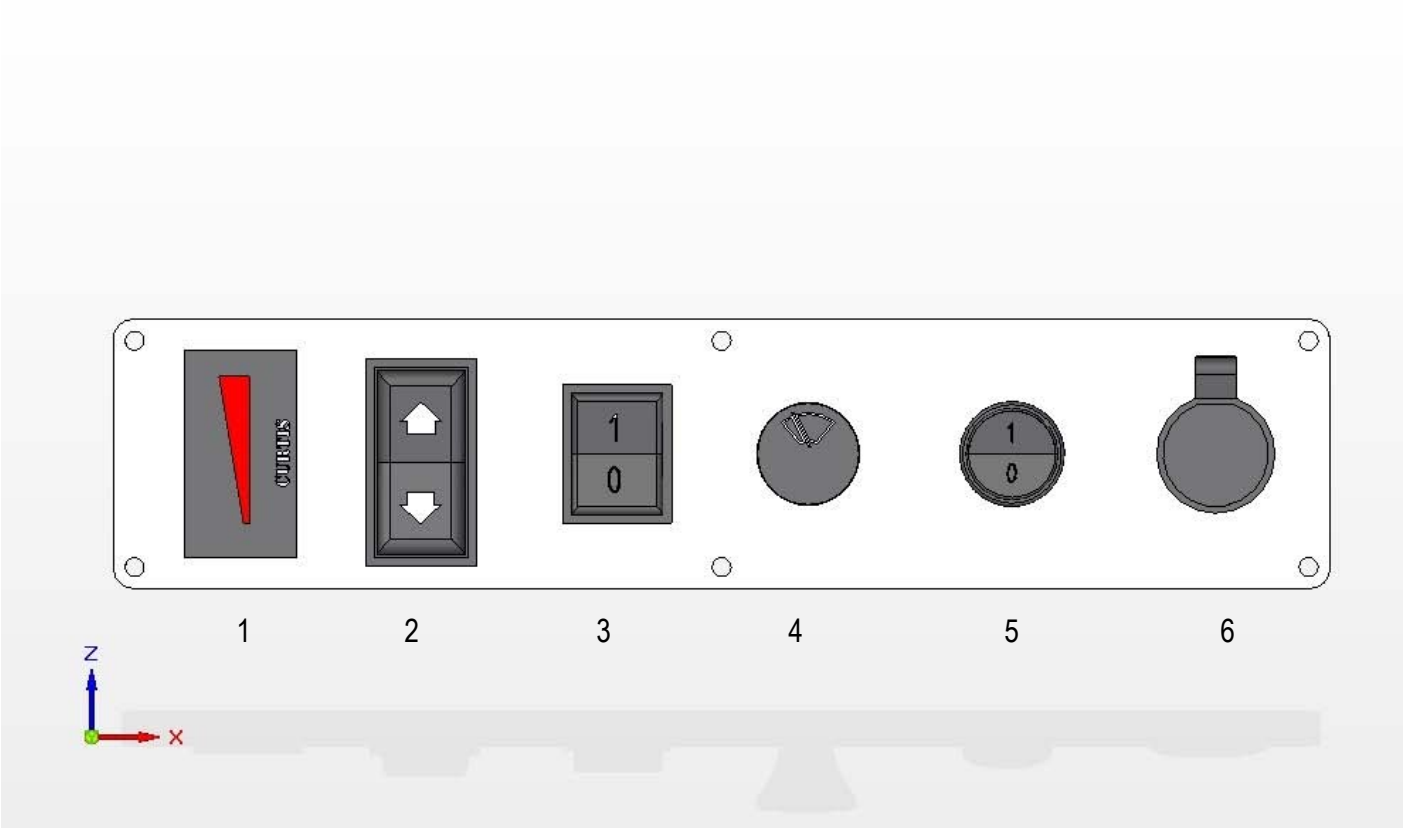
Specifications

Model: 4x4

Weight	1625 lbs. / 737.08 kg
Load Capacity	1000 lbs. / 453.59 kg
Dimensions (LWH)	100”/50”/80”
Tires (4-ply)	Duro® 23” x 8” x 12” (front) Duro® 23” x 10” x 12” (rear)
Tire Pressure	10-12 psi
Lights	55-watt Halogen
Brakes	4-Wheel Hydraulic Disc Brakes
Front Suspension	Independent heavy duty coil over springs with hydraulic shock absorbers
Rear Suspension	Independent with dual a-arms and coil over shocks
Transmission	Automatic Transmission with electronic forward/reverse/neutral solid state rocker switch
Motor	Kinetek® 4.4KW 48 Volt DC/5.9 HP nominal/ 19 HP peak
Electric voltage	48-volt D.C. Six 8-volt deep cycle AGM (Dry Cell) 230 AH, 2 gauge Copper wiring
Speed Controller	Curtis® separately excited, 500-Amp output
Speed	20-25 mph / 32-40 km/hr
Charger	Delta-Q® automatic 48 Volt, 18 amp DC Output

Control Functions - Dashboard

NEV2 NEV4 CEV2



Dashboard Button Functions

1. **Battery Charge Meter** – This meter indicates the current state of charge for the battery system
2. **Direction Selector** – This switch is used to change the direction of the vehicle. The up arrow indicates Forward and the down arrow indicates Reverse. The middle position indicates Neutral.
3. **Headlight/Taillight Switch** – Turns headlights and taillights on and off
4. **Windshield Wiper Switch** – Operates the windshield wiper
5. **Auxiliary Switch** – Available switch for auxiliary use
6. **12 Volt Power Outlet** – For 12 volt auxiliary accessories

Control Functions
NEV2 NEV4 CEV2

Entering the Vehicle
All passengers must be seated with seat belt properly fastened at all times while the Ruff & Tuff electric vehicle is in use.

Ignition Switch
Functions of the respective switch positions are as follows:

ON:
Motor will operate only at this position.

OFF:
All electrical circuits are switched off. The key can be removed in this position.

Turning the Vehicle On
Hold foot brake. Before rotating key forward to the "On" position make sure the direction selector is in the Neutral position.

Driving the Vehicle
Hold Foot brake. Select the desired direction by using the dash mounted direction selector (forward/reverse/neutral). Release Park Brake by depressing the bottom part of the brake pedal. Release foot brake pedal. Accelerate smoothly by pressing the accelerator pedal with foot. Always be aware of surrounding terrain and use caution. Judge speed accordingly. Be cautious when encountering loose or wet terrain. Do not attempt steep grades. (See Safety pages 40-44)

Stopping the Vehicle
To stop, release accelerator pedal and apply foot brake pedal. To engage Park Brake, engage pressure to the top part of the pedal until it locks.

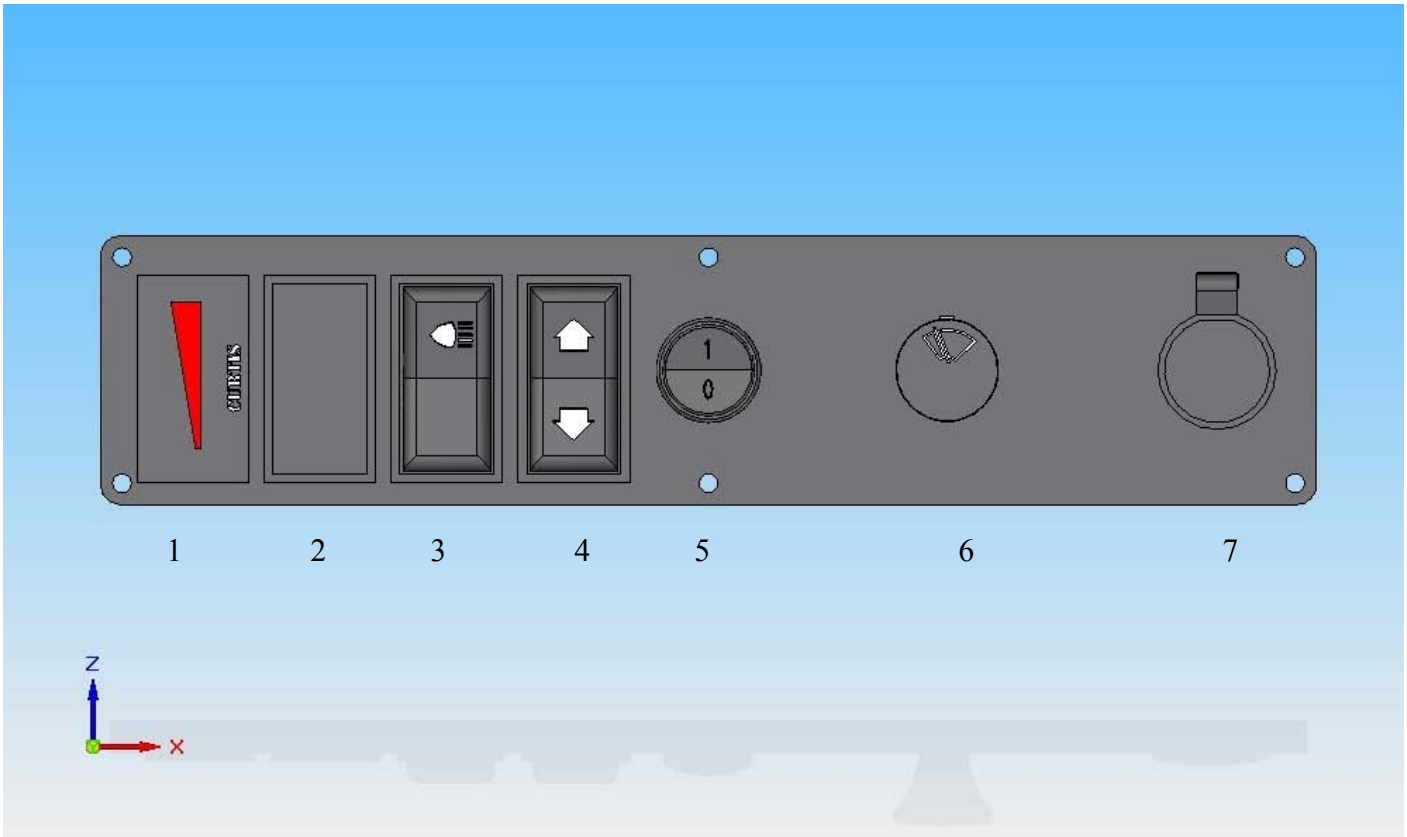
Turning the Vehicle Off
After applying the Park Brake, switch the key to the OFF position; switch the direction selector on the dashboard to the Neutral (N) position.

Exiting the Vehicle
Once the vehicle has come to a complete stop, the Park Brake has been applied, the key switch has been turned to the OFF position, and the direction selector has been switched to the Neutral position, all passengers can carefully exit the vehicle. Never attempt to exit the vehicle while it is still moving. This could lead to severe injury.

Storing the Vehicle
Store the Ruff & Tuff electric vehicle with Park Brake applied, key switch in the OFF position, and the direction selector in the Neutral position.

Control Functions - Dashboard

CLX2 CLX4

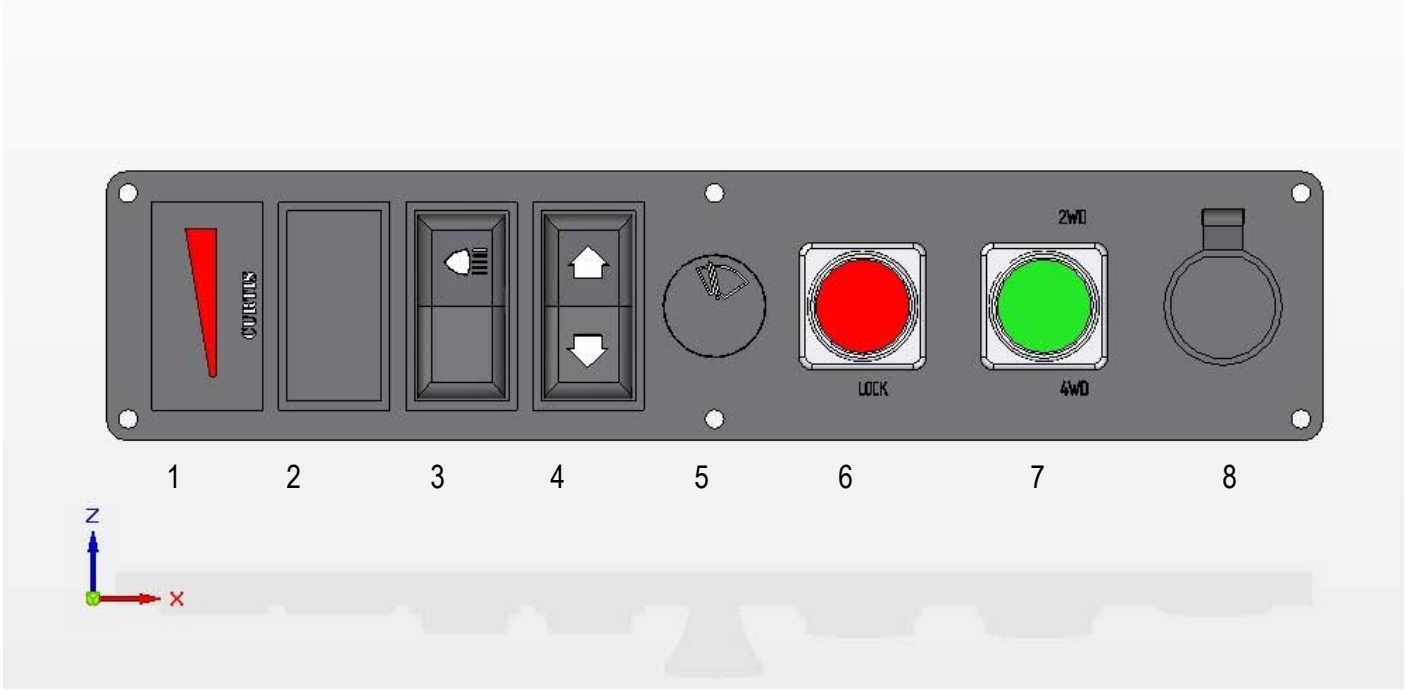


Dashboard Button Functions

1. **Battery Charge Meter** – This meter indicates the current state of charge for the battery system
2. **Available Auxiliary Switch Location**
3. **Headlight Switch** – Toggle switch that turns the headlights and taillights on and off.
4. **Direction Selector** – This switch is used to change the direction of the vehicle. The up arrow indicates Forward and the down arrow indicates Reverse. The middle position indicates Neutral.
5. **Auxiliary Switch**– Available switch for auxiliary use
6. **Windshield Wiper Switch** - Operates the windshield wiper
7. **12 Volt Power Outlet** – For 12 volt auxiliary accessories

Control Functions - Dashboard

4x4



Dashboard Button Functions

1. **Battery Charge Meter** – This meter indicates the current state of charge for the battery system
2. **Available Auxiliary Switch** - Available port for auxiliary use
3. **Headlight Switch** – Turns the headlights and taillights on and off.
4. **Direction Selector** – This switch is used to change the direction of the vehicle. The up arrow indicates Forward and the down arrow indicates Reverse. The middle position indicates Neutral.
5. **Windshield Wiper Switch** – Operates the windshield wiper
6. **4-Wheel Low Button** – See 4x4 Control Functions section of this manual (pages 19-20)
7. **2 Wheel High/4 Wheel High** – See 4x4 Control Functions section of this manual (pages 19-20)
8. **12 Volt Power Outlet** – Used for auxiliary powered accessories

Control Functions

CLX2 CLX4 4x4

Entering the Vehicle
All passengers must be seated with seat belt properly fastened at all times while the Ruff & Tuff electric vehicle is in use.

Ignition Switch
Functions of the respective switch positions are as follows:

ON:
Motor will operate only at this position.

OFF:
All electrical circuits are switched off. The key can be removed in this position.

Turning the Vehicle On
Hold foot brake. Before rotating key forward to the "On" position make sure the direction selector is in the Neutral position.

Driving the Vehicle
Hold Foot brake. Select the desired direction by using the dash mounted direction selector (forward/reverse/neutral). Release Park Brake by depressing the Park Brake pedal. Release foot brake pedal. Accelerate smoothly by pressing the accelerator pedal with foot. Always be aware of surrounding terrain and use caution. Judge speed accordingly. Be cautious when encountering loose or wet terrain. Do not attempt steep grades. (See Safety pages 40-44)

Stopping the Vehicle
To stop, release accelerator pedal and apply foot brake pedal. To engage Park Brake, depress Park Brake until locked.

Turning the Vehicle Off
After applying the Park Brake, switch the key to the OFF position; switch the direction selector on the dashboard to the Neutral (N) position.

Exiting the Vehicle
Once the vehicle has come to a complete stop, the Park Brake has been applied, the key switch has been turned to the OFF position, and the direction selector has been switched to the Neutral position, all passengers can carefully exit the vehicle. Never attempt to exit the vehicle while it is still moving. This could lead to severe injury.

Storing the Vehicle
Store the Ruff & Tuff electric vehicle with Park Brake applied, key switch in the OFF position, and the direction selector in the Neutral position.

2WD/4WD Front Differential Operation

(*Applies to 4x4 Vehicle Only*)

Use Only When Necessary

Recommended Transfer Case Settings:

Driving Conditions	Transfer Case Settings		
	2↑	4↑	4↓
Normal	YES		
Severe		YES	
Extreme			YES

You can choose among three (3) drive settings:

2↑ (Two-Wheel High): Neither Button Depressed This setting is for driving in most street and off-road situations. Your front axle is not engaged in two-wheel drive.

4↑ (Four-Wheel High): Green Button Depressed This setting engages your front axle to help drive your vehicle. Use four-wheel high when you need extra traction, such as on snowy or icy roads, or in more-aggressive off-road situations.

4↓ (Four-Wheel Low): Green and Red Button Depressed (Depress the Green Button first, then the Red Button) This setting also engages your front axle to give you extra traction. You may never need Four-Wheel Low. It sends the maximum power to the front wheels. You might choose Four-Wheel Low if you were driving off-road in sand, mud or deep snow and while climbing hills. While operating in Four-Wheel Low, the steering will be exaggerated and heavy.

Shifting from Two-Wheel High to Four-Wheel High
Press and release the Four-Wheel High (green) button. This can be done at low speed (less than 5 mph), and the front axle will lock automatically with some delay.

Shifting from Four-Wheel High to Two-Wheel High
Press and release the Four-Wheel High (green) button. This can be done at low speed (less than 5 mph), and the front axle will unlock automatically with some delay.
It is normal to hear and feel your vehicle's transfer case shift into Four-Wheel drive. If you shift with the vehicle stopped, it may be necessary to shift the transmission momentarily into REVERSE (R) and FORWARD (F) to engage or disengage the front axle.

Control Functions

4x4 ONLY

Shifting from Two-Wheel High or Four-Wheel High to Four-Wheel Low

Note: Shifting the transfer case into four-wheel low while moving at speeds faster than 5 mph may cause premature wear to the transfer case, and may cause the gears to grind. To avoid causing premature wear, and grinding the gears, do not shift the transfer case into four-wheel low while the vehicle is moving faster than 5 mph.

To shift from Two-Wheel High or Four-Wheel High to Four-Wheel Low, the vehicle must be stopped or moving less than 5 mph. While in Two-Wheel High press the green button to engage 4-Wheel High and then press the red button to engage Four-Wheel Low. NOTE: Depressing the Red Button alone will not engage Four Wheel Low.

Shifting from Four-Wheel Low to Four-Wheel High or Two-Wheel High

To shift from four-wheel low to Four-Wheel High or Two-Wheel High, your vehicle must be stopped or moving less than 5 mph. The preferred method for shifting out of Four-Wheel Low is to have your vehicle moving 5 mph or less and depress the red button for Four-Wheel High and then the green button for Two-Wheel High.

Discover ™
Battery Information

Battery Information

Battery Frequently Asked Questions

1.) What type of batteries are installed on my Ruff & Tuff vehicle?

Your Ruff and Tuff vehicle is equipped with Discover™ AGM (VRLA) Dry Cell batteries.

2.) How does an AGM (VRLA) battery work?

AGM (VRLA) batteries are designed using proven valve regulated gas recombination technology that removes the need for regular water addition by controlling the evolution of hydrogen and oxygen during charging. This means that the oxygen normally produced on the positive plates of all lead-acid batteries is absorbed by the negative plate. This suppresses the production of hydrogen at the negative plate. Water (H20) is produced instead, retaining the moisture within the battery. ***It never needs watering, and should never be opened*** as this would "poison" the battery with additional oxygen from the air.

3.) Why can't / shouldn't AGM (VRLA) batteries be opened?

VRLA (Valve-Regulated Lead-Acid) batteries, sometimes called SLA (Sealed Lead-Acid) batteries or SVR (Sealed Valve-Regulated) batteries work on a recombination principle. Oxygen gas is produced at the positive plates during charge. The charged negative plates react first with this oxygen and subsequently with the electrolyte. Water is produced and the negative plates are very slightly discharged. Additional charging recharges the negative plates instead of producing hydrogen gas. Since very little hydrogen and oxygen is lost and the water (H20) is retained, we say that the gasses have recombined. To work properly, the oxygen produced must be retained in the battery until the reaction is completed. Positive pressure allows the gas to be retained. In a sealed battery a balance is maintained between the hydrogen, oxygen and charge. If a VRLA battery is opened, or leaks, the negative plates are exposed to extra oxygen from the atmosphere. This excess oxygen upsets the balance. The negative plates become discharged. The positive plates may be subsequently severely overcharged. The battery will fail prematurely.

4.) Why am I not getting the run time I expect from my Discover™ AGM batteries?

Discover™ EV batteries are made with thicker plates than other batteries. It is because of these thick plates that we are able to get longer cycle life from our batteries. The downside is that it takes longer for all of the material inside these plates to become active. It takes approximately 20-25 cycles (and as many as 75-100) to break the battery in. Alternatively, your expectations may be too high given battery sizing verses discharge; operating temperature extremes, operating terrain or the amount of weight being carried on the vehicle.

5.) What affect does temperature have on my batteries?

Temperature is a major factor in battery performance, shelf life, charging and voltage control. A battery's available capacity varies at various temperatures. As the ambient temperature rises, a battery's ability to deliver current increases. As the temperature falls, so does the battery's ability to deliver current.
Even though battery capacity at high temperatures is higher, battery life is shortened. Battery capacity is reduced by >50% at -27˚C / -22°F - but battery life may be increased by as much as 60%. Alternatively, battery life may be reduced in half for every 10°C / 15°F over 25°C / 77°F. This is true for any type of Lead-Acid battery. NOTE: Even though a battery's ability to deliver and receive current (charge) goes up as temperature rises, operation at extreme temperatures above 30˚C / 86˚F will shorten the life of the battery. Conversely a battery's ability to deliver and receive current drops as temperature drops and operation at

extreme temperatures below 10˚C / 50˚F will dramatically decrease available capacity or run time and will dramatically increase the time required to re-charge!
The Thermal Mass of larger batteries and battery banks introduces more things to think about. Because these batteries have so much mass, they will change internal temperature much slower than the surrounding air temperature. A large, insulated battery bank may vary as little as 10˚ over 24 hours internally, even though the air temperature varies from 20˚ to 70˚ degrees.

a. ***Note: Please see the graph on page 33 for more information about temperature's effect on your batteries***

6.) How often should I charge my batteries?

a. Your Ruff & Tuff Vehicle is equipped with Discover™ AGM Dry Cell batteries. These batteries have no memory. However, it is recommended to opportunity charge these batteries even after minimal use. Opportunity charging is a battery charging technique that can extend the run times and service of battery powered equipment. The term "opportunity charging" refers to the charging of the batteries wherever and whenever power is available. Simply put, rather than waiting for the battery to be completely discharged, charge whenever possible.
b. When the red light begins to blink on the dashboard, you have approximately 1-2 miles of usage left. Charging the vehicle will take approximately 10-12 hours depending on the state of discharge.

7.) How do I charge my batteries?

a. Your Ruff & Tuff Vehicle is equipped with an onboard charger that is multiple rated and operates on a standard single pole 15-Amp breaker in applicable mode.
b. This charger has a pigtail plug, which you attach to the supplied AC cord and then plug into the wall outlet.
c. Your onboard charger unit has an LED light that indicates completion of battery charge. A green light display indicates a full charge. Your onboard charger will automatically shut off after charging is complete.
d. It is normal for your onboard charger's operating temperature to be quite warm. This charger is fin cooled, not fan cooled. The best way to charge your Ruff & Tuff vehicle is to **open the front seat or prop in the open position** to help dissipate the heat created by charging the vehicle.
e. ***Note: Please see the "Charger Operating Instructions" section of this Owner's Manual for more information on the operation of your charger (Page 34-39)***

8.) How do I store my batteries?

a. All batteries will have a self-discharge or internal electrochemical "leakage" of between 1% and 15% per month. This will cause the battery to become sulfated and fully discharged over time. Higher temperatures accelerate this process. A battery stored at 95˚ F (35˚ C) will self discharge twice as fast than one at 75˚ F (23.9˚ C).
b. Your vehicle is equipped with Discover™ AGM batteries. Discover™ Advanced AGM or Gel batteries will naturally discharge at approximately; 2% per month when stored at 8˚C/46˚F; 3% per month when stored at 20˚C/68˚F; 5% per month when stored at 30˚C/86˚F; 10% per month when stored at 40˚C/104˚F.
c. Discover™ AGM sealed batteries can be stored in temperatures as low as -25°F without freezing provided the batteries are fully charged.

d. For winter storage, the batteries must be clean, fully charged and disconnected from any source of electrical drain.
e. As with all electric vehicles, the batteries should be checked and recharged as required or at a minimum of 30-day intervals.

EVGC8A-A

Absorbed Glass Mat VRLA Industrial Battery Block

Discover® Clean & Green™ Series EV Traction Dry Cell Industrial Batteries provide superior high integrity and reliability for environmentally sensitive areas, commercial, industrial and private applications. The maintenance-free, valve regulated lead acid (VRLA) construction makes Discover® EV Traction Batteries the definitive choice for Mobility and Home Medical Equipment (HME); Broadband and Cable TV (CATV); Uninterruptible Power Supplies (UPS); Telecommunication; Photovoltaic, Solar and Renewable Energy Storage; Electronic and Security; Marine and RV; Golf and Electric Vehicle; Aerial Lifts and Fork Lifts; Floor Machines and Robotics.

Features & Benefits

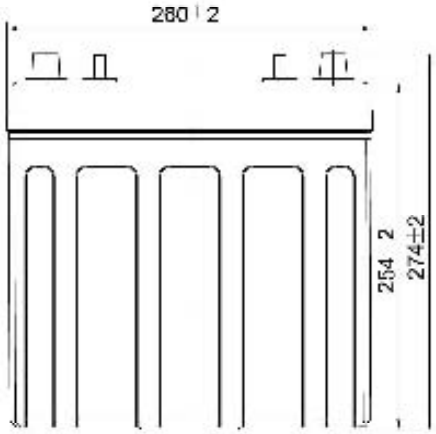
EV Traction Dry Cell

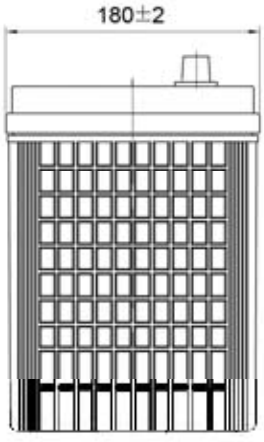
- Completely sealed valve regulated construction.
- Flame arresting pressure regulated safety sealing valves for safety, operating pressure management and protection against atmospheric contamination (excess oxygen being absorbed by negative plates).
- Computer-aided 99.994% pure heavy-duty lead calcium grid designs.
- Tank formed places guarantees evenly formed and capacity matched plates.
- Discover® proprietary Vision Max® Paste Formula.
- Anchored plate groups to guard against vibration.
- Double insulating Micro porous glass fiber separators.
- Measured and immobilized electrolyte.
- Vacuum filling and weighing processes.
- Advanced technology for efficient gas recombination of up to 99.9% and freedom from electrolyte maintenance.
- Wide range of operating temperatures (-40°C to 60°C).
- Low self discharge rates (Approx. 1%-3% monthly at 20 °C 25°C / 68°F 77°F).
- High impact reinforced strength copolymer polypropylene cases and flat top designed covers that are rugged and vibration resistant.
- Thermally welded case to cover bonds that eliminate leakage.
- Copper and stainless steel alloy terminals and hardware.
- Multi-terminal options.
- Terminal protectors.
- Removable carry handles.
- Industry leading size and performance options.
- Classified as "NON-SPILLABLE BATTERY" Not restricted for Air (IATA/ICAO) Provision 67, Surface (DOT-CFR-HMR49)or Water (Classified as non-hazardous per IMDG amendment 27) transportation.
- Can be used in multiple orientations (upside down is not recommended).
- Compatible with sensitive electronic equipment.
- Quality Assurance processes with ISO (4400/992579), QS and TUV Certification EMC tested. CE, ETTS Germany (G4M19806-9202-E-16). UL recognized and approved components (MH29050).
- Telcordia and Bellcore compliant.

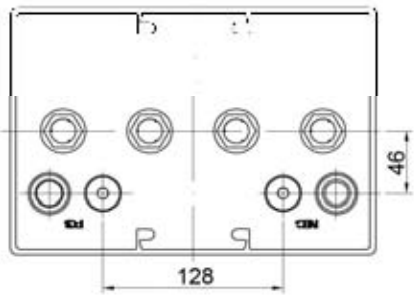
EVGC8A-A

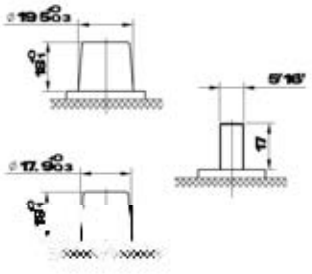
Mechanical Characteristics

Industry Type No.	Volts	Standard (optional) Terminals	Dimensions in Inches (mm)				Approx. Weight in Lbs (Kgs)
			L in(mm)	W in(mm)	H in(mm)	TH in(mm)	
GC8	8	AM	10.2 (260)	7.1 (180)	10 (254)	10.8 (274)	66.1 (30)









EVGC8A-A

Electrical Specifications

Ampere Hour Capacity			Minutes of Discharge					R/C	Cranking Amps	
20HR	10HR	5HR	@25A	@56A	@75A	@85A	@100A	@25A	32°F/ 0°C	0°F/ -18°C
* - Performance averages after 25 cycles										
170	156	144	361	115	75	62	49	330	1000	750

Constant current discharge ratings-amperes at 20℃(68℉)

End Point Volts/Cell	5min	10min	15min	30min	45min	1h	3h	5h	10h
1.60V	- -	- -	- -	- -	109	89.0	43.5	29.6	15.9
1.65V	- -	- -	- -	- -	106	87.7	43.2	29.4	15.8
1.70V	- -	- -	- -	- -	104	86.3	42.8	29.1	15.7
1.75V	- -	- -	- -	- -	102	84.9	42.3	28.8	15.6
1.80V	- -	- -	- -	- -	99.3	83.5	41.9	28.5	15.5

Constant power discharge ratings-watts per cell at 20℃(68℉)

End Point Volts/Cell	5min	10min	15min	30min	45min	1h	2h	3h	5h
1.60V	- -	- -	- -	- -	181	151	92.8	69.9	50
1.65V	- -	- -	- -	- -	179	150	91.9	69.5	49.8
1.70V	- -	- -	- -	- -	176	148	91.1	68.9	49.5
1.75V	- -	- -	- -	- -	173	145	90.1	68.4	49.1
1.80V	- -	- -	- -	- -	169	143	89.2	67.9	48.8

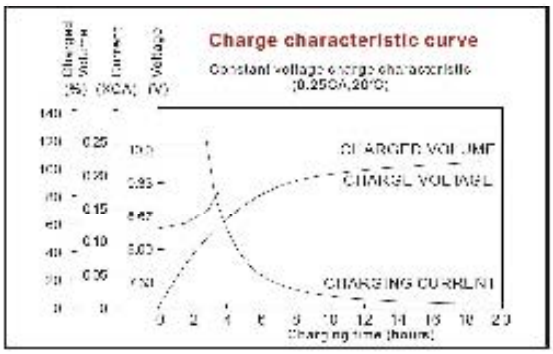
Internal resistance	Fully charged at 20℃: 2.3 mOhms		
Self discharge	<3% of capacity per month at 20℃		
Operating temperature range	Discharge	Charge	Storage
	-20~60℃	-10~50℃	-20~60℃
Short circuit current (20℃)	2700A		

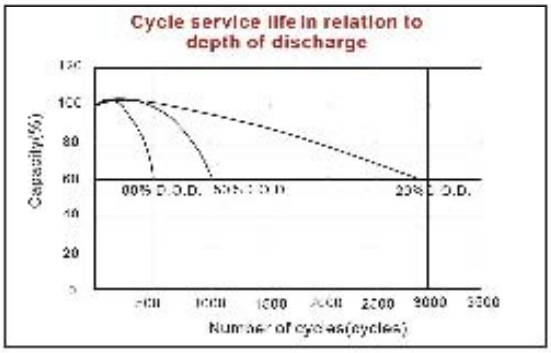
CHARGE METHODS: Constant voltage charge at 20℃(68℉)	Charge voltage	Temperature compensation	Maximum Current	Peak 5 seconds	Peak 10 seconds	Maximum continuous	Recommended maximum continuous
Standby use	9.08-9.20V	-13.2mV/℃	Maximum charge current	1C10A	0.75C10A	0.5C10A	0.3C10A
Cyclic use	9.6-9.8V	-20mV/℃	Maximum discharge current	2C10A	1.5C10A	1C10A	0.5C10A

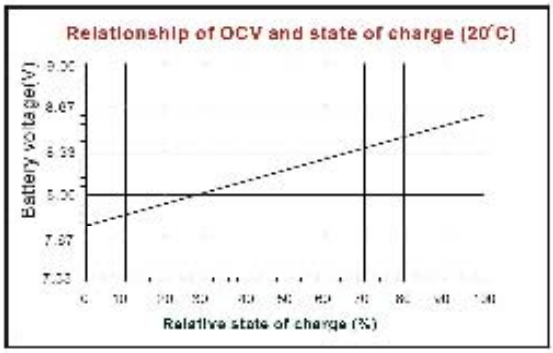
Contact Discover Engineering for OEM specific charging algorithms!

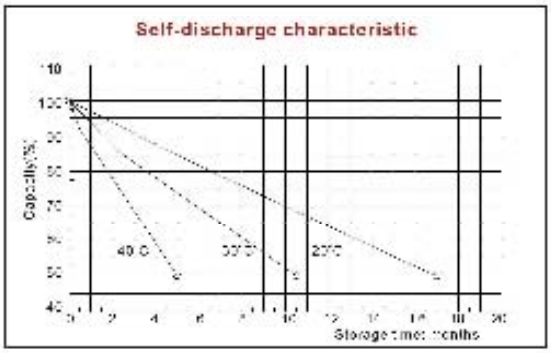
EVGC8A-A

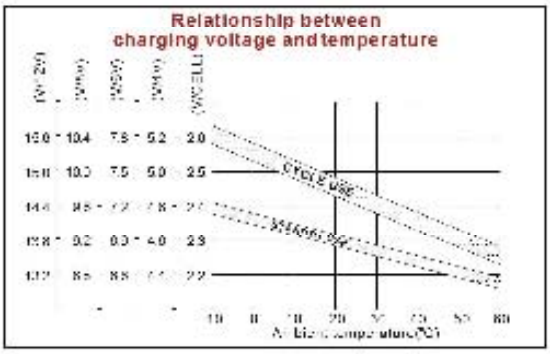
Charge / Discharge Tables & Graphs

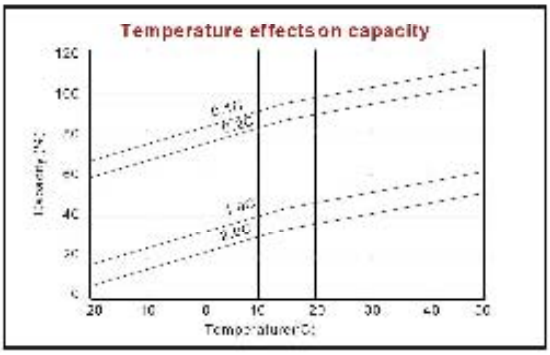












EV805A

Absorbed Glass Mat VRLA Industrial Battery Block

Discover® Clean & Green ™ Series EV Traction Dry Cell Industrial Batteries provide superior high integrity and reliability for environmentally sensitive areas, commercial, industrial and private applications. The maintenance-free, valve regulated lead acid (VRLA) construction makes Discover® EV Traction Batteries the definitive choice for Mobility and Home Medical Equipment (HME); Broadband and Cable TV (CATV); Uninterruptible Power Supplies (UPS); Telecommunication; Photovoltaic, Solar and Renewable Energy Storage; Electronic and Security; Marine and RV; Golf and Electric Vehicle; Aerial Lifts and Fork Lifts; Floor Machines and Robotics.

Features & Benefits

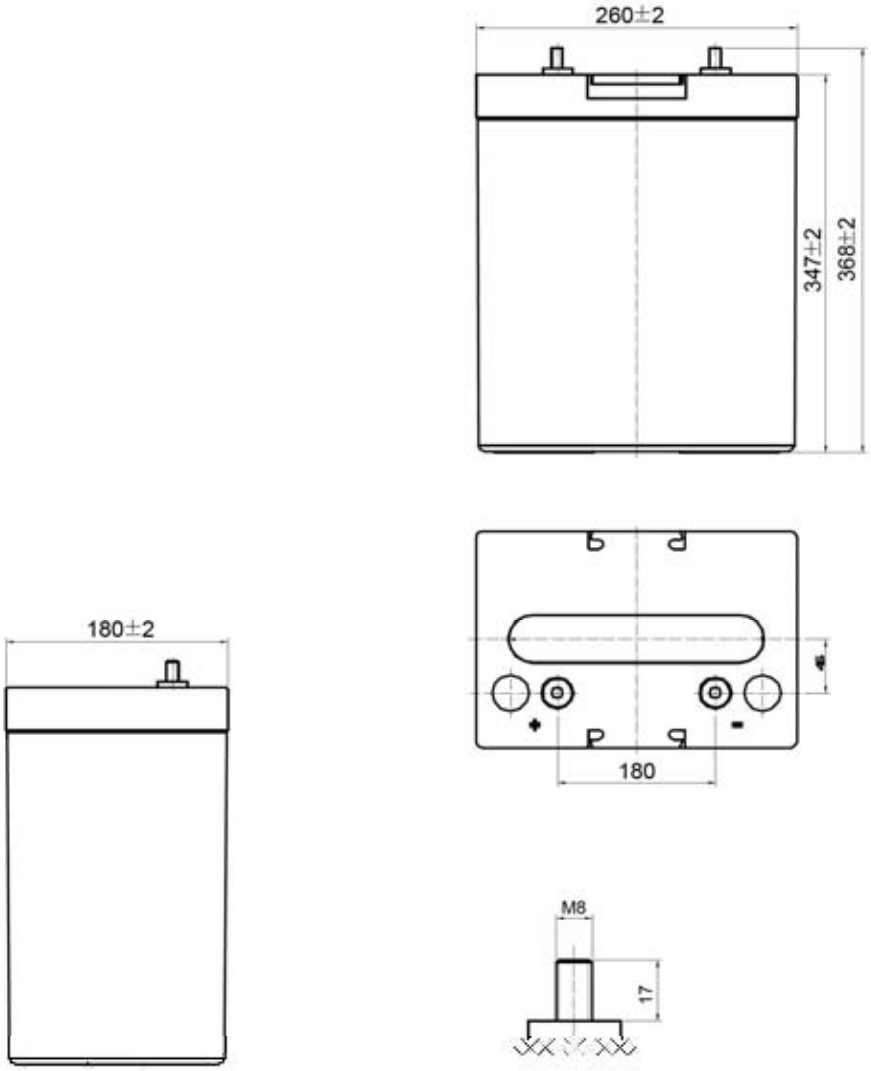
EV Traction Dry Cell

- Completely sealed valve regulated construction.
- Flame arresting pressure regulated safety sealing valves for safety, operating pressure management and protection against atmospheric contamination (excess oxygen being absorbed by negative plates).
- Computer-aided 99.994% pure heavy-duty lead calcium grid designs.
- Tank formed plates guarantees evenly formed and capacity matched plates.
- Discover® proprietary Vision Max® Paste Formula.
- Anchored plate groups to guard against vibration.
- Double insulating Micro porous glass fiber separators.
- Measured and immobilized electrolyte.
- Vacuum filling and weighing processes.
- Advanced technology for efficient gas recombination of up to 99.9% and freedom from electrolyte maintenance.
- Wide range of operating temperatures (-40°C to 60°C).
- Low self discharge rates (Approx. 1%-3% monthly at 20 °C 25°C / 68°F 77°F).
- High impact reinforced strength copolymer ABS cases and flat top designed covers that are rugged and vibration resistant.
- Epoxy adhesion case to cover bonds that eliminate leakage.
- Copper and stainless steel alloy terminals and hardware.
- Multi-terminal options.
- Terminal protectors.
- Removable carry handles.
- Industry leading size and performance options.
- Classified as "NON-SPILLABLE BATTERY" Not restricted for Air (IATA/ICAO) Provision 67, Surface (DOT-CFR-HMR49)or Water (Classified as non-hazardous per IMDG amendment 27) transportation.
- Can be used in multiple orientations (upside down is not recommended).
- Compatible with sensitive electronic equipment.
- Quality Assurance processes with ISO (4400/992579), QS and TUV Certification EMC tested. CE, ETTS Germany (G4M19808-9202-E-16). UL recognized and approved components (MH29050).
- Telcordia and Bellcore compliant.

EV805A

Mechanical Characteristics

Industry Type No.	Volts	Standard (optional) Terminals	Dimensions In Inches (mm)				Approx. Weight in Lbs (Kgs)
			L in(mm)	W in(mm)	H in(mm)	TH in(mm)	
805	8	F20 (M8)	10.2 (260)	7.1 (180)	13.7 (347)	14.5 (368)	102 (46.3)



EV805A

Electrical Specifications

Ampere Hour Capacity			Minutes of Discharge					R/C	Cranking Amps	
20HR	10HR	5HR	@25A	@56A	@75A	@85A	@100A	@25A	32°F/ 0°C	0°F/ -18°C
* - Performance averages after 25 cycles										
230	210	197	533	214	151	128	103	478	1400	1050

Constant current discharge ratings-amperes at 20℃(68℉)

End Point Volts/Cell	5min	10min	15min	30min	45min	1h	3h	5h	10h
1.60V	- -	- -	- -	- -	185	151	63.1	40.5	21.4
1.65V	- -	- -	- -	- -	180	149	62.6	40.2	21.3
1.70V	- -	- -	- -	- -	177	147	62.1	39.8	21.1
1.75V	- -	- -	- -	- -	173	144	61.3	39.4	21.0
1.80V	- -	- -	- -	- -	169	142	60.8	39.0	20.9

Constant power discharge ratings-watts per cell at 20℃(68℉)

End Point Volts/Cell	5min	10min	15min	30min	45min	1h	2h	3h	5h
1.60V	- -	- -	- -	- -	308	257	148	105	68.4
1.65V	- -	- -	- -	- -	304	255	147	104	68.1
1.70V	- -	- -	- -	- -	299	252	146	103	67.7
1.75V	- -	- -	- -	- -	294	247	144	103	67.2
1.80V	- -	- -	- -	- -	287	243	143	102	66.8

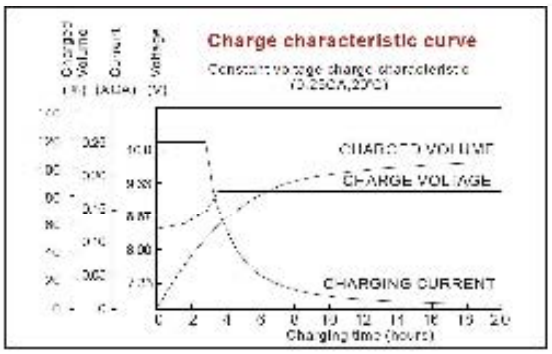
Internal resistance	Fully charged at 20℃: 2.6 mOhms		
Self discharge	<3% of capacity per month at 20℃		
Operating temperature range	Discharge	Charge	Storage
	-20~60℃	-10~50℃	-20~60℃
Short circuit current (20℃)	2300A		

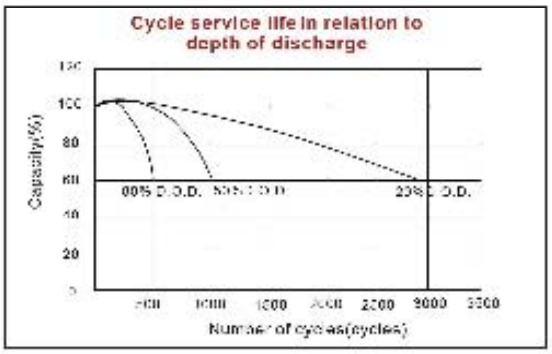
CHARGE METHODS: Constant voltage charge at 20℃(68℉)	Charge voltage	Temperature compensation	Maximum Current	Peak 5 seconds	Peak 10 seconds	Maximum continuous	Recommended maximum continuous
Standby use	9.08-9.20V	-13.2mV/℃	Maximum charge current	1C10A	0.75C10A	0.5C10A	0.3C10A
Cycle use	9.6-9.8 V	-20mV/℃	Maximum discharge current	2C10A	1.5C10A	1C10A	0.5C10A

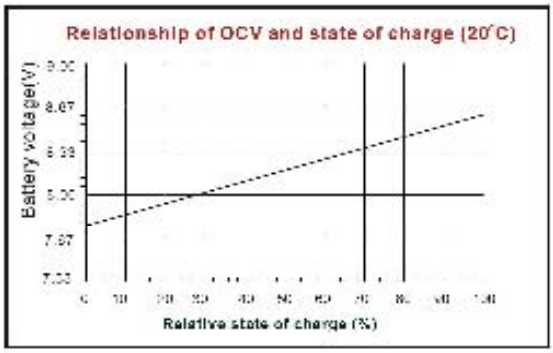
Contact Discover Engineering for OEM specific charging algorithms!

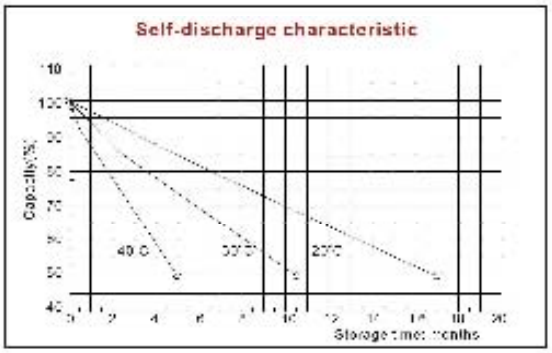
EV805A

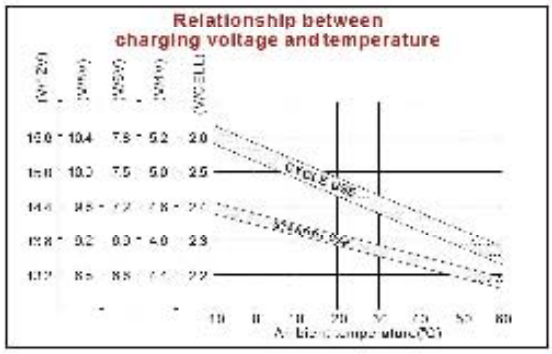
Charge / Discharge Tables & Graphs

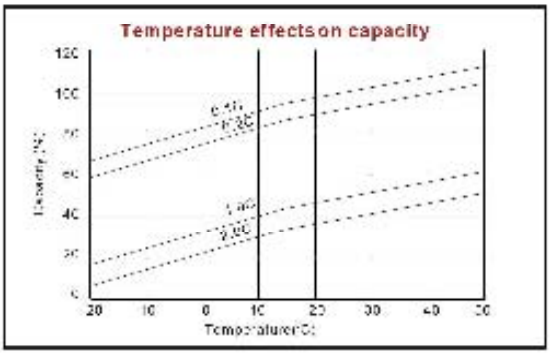












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Temperature Effects On Battery Performance & Life

Different temperatures affect the internal chemical reaction rates, and internal resistance and efficiency of all types of batteries.

Run times will vary as temperatures change:

Batteries are significantly less efficient under heavy discharges at lower temperatures

↑Increasing as the temperature rises above 25°C / 77°F

↓Decreasing as the temperature drops below 25°C / 77°F

Charge times will vary as temperatures change:

Batteries are significantly less efficient when being charged at lower temperatures

↑Increasing as the temperature drops below 25°C / 77°F

↓Decreasing as the temperature rises above 25°C / 77°F

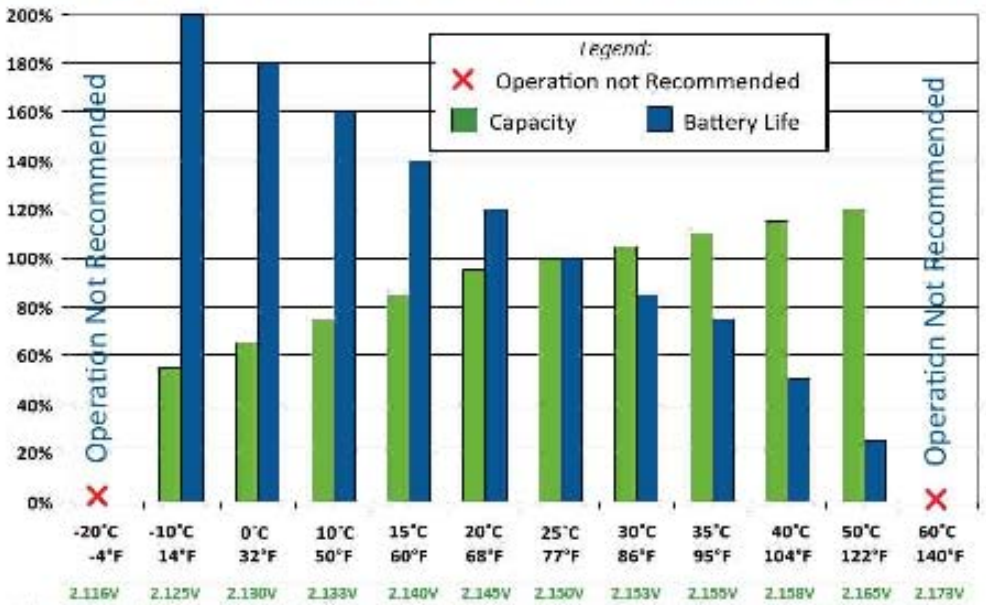
Battery life will vary when operated at different temperatures:

Continued operation at higher temperatures will shorten battery life.

↑Increasing as the temperature drops below 25°C / 77°F

↓Decreasing as the temperature rises above 25°C / 77°F

Battery Capacity & Battery Life Compared at Different Temperatures



Voltage: At rest (off charge for 8 to 24 hours) per Cell - Voltmeter Readings at various temperatures for a 100% charged battery.

Definitions and things to know:

Data provided as representative only. Battery voltage, capacity and life will vary with actual environmental conditions and operator driving habits. Operation above 50°C / 122°F and below -10°C / 14°F is not recommended. **Temperature:** C: Celsius, F: Fahrenheit. **Capacity:** Operation or available "run time" as a % of base-line capacity established using industry standard testing at 25°C / 77°F. **Battery Life:** Expected battery life as a % of base line life established using industry standard testing at 25°C / 77°F. **Voltage:** For Discover® Batteries, multiply the voltages shown by 3 for 6-volt batteries, by 4 for 8-volt batteries and by 6 for 12-volt batteries.

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Delta-Q QuiQ ™
Charger Information

Charger Information

Charger Operating Instructions

1) Always use a grounded outlet. If using an extension cord, be sure and use a grounded 3-wire 12 AWG cord to avoid excessive voltage drops.
2) The charger will then turn on and experience a short LED indicator self-test for approximately 2 seconds. If connected to a battery pack, a trickle current will be applied to the charger until a minimum voltage is reached. If charger is waiting to be connected to a battery pack and being used in an off-board application, the charging algorithm number will be displayed for approximately 11 seconds and then display an under-voltage fault (the fault will disappear when plugged into the battery.)
3) When a minimum battery voltage has been detected, charger will enter the bulk charging constant-current stage. The length of charge will vary depending on how large and how depleted the battery pack is, the ambient temperature, and the input voltage. If the ambient temperature is too high, charge power will be reduced to maintain a maximum interval temperature. If the input AC voltage is low, charge power will be reduced to avoid high input currents.
4) At the time the battery is at approximately 80% state of charge, the bulk stage is then completed and an >80% charge notification is given. In the next phase, known as the absorption or constant-voltage phase, the last 20% of charge will be returned to the battery. If the vehicle requires immediate usage, charging could be terminated at this point. However, it is recommended to wait for 100% charge notification to ensure maximum battery capacity and life.
5) A low current "finish-charge" is lastly applied to return and maintain capacity.
6) The battery is then completely charged. You may now unplug the charger from AC power. If kept plugged in, the charger will automatically restart another complete charge cycle if the voltage drops below a minimum voltage or 30 days has passed.
7) If faults occurred at any time during the charging process, a fault notification is given by flashing RED with corresponding code. Some errors are serious and may require human intervention to fix the problem and then reset the charge by disconnecting AC power for at least 15 seconds. Others may automatically recover when the fault condition is eliminated. To indicate which error occurred, a fault notification will flash RED a number of times, stop, and then repeat.
   [1 FLASH] Battery Voltage High: auto-recover
   [2 FLASH] Battery Voltage Low: auto-recover
   [3 FLASH] Charge Timeout: the charge failed to complete in the allotted time. This might indicate a problem with the battery pack, or that the charger output was reduced due to high ambient temperatures.
   [4 FLASH] Check Battery: battery pack could not be trickled charged to the minimum level required for initial charge. May indicate one or more cells in the battery pack are damaged or shorted.
   [5 FLASH] Over-Temperature: auto-recover. Charger has shutdown because of high internal temperature. Typically indicates no sufficient airflow for cooling.
   [6 FLASH] Fault: an internal fault has been detected. After disconnecting AC power for at least 15 seconds, if Fault 6 is again displayed, the charger must be taken to a qualified service depot.

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS

This manual contains important safety, operating, and installation instructions – read before using charger.

Battery Safety Information

Warning: Use charger only on battery systems with an algorithm selected that is appropriate to the specific battery type. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal operation. Keep sparks, flames, and smoking materials away from batteries. Provide adequate ventilation during charging. Never charge a frozen battery. Study all battery manufacturers' specific precautions such as recommended rates of charge and removing or not removing cell caps while charging.

Electrical Safety Information

Danger: Risk of electric shock. Connect charger power cord to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded outlet is required to reduce risk of electric shock – do not use ground adapters or modify plug. Do not touch uninsulated portion of output connector or uninsulated battery terminal. Disconnect the AC supply before making or breaking the connections to the battery while charging. Do not open or disassemble charger. Do not operate charger if the AC supply cord is damaged or if the charger has received a sharp blow, been dropped, or otherwise damaged in any way – refer all repair work to qualified personnel. Not for use by children.

INFORMATIONS IMPORTANTES DE SÉCURITÉ

Conserver ces instructions. Ce manuel contient des instructions importantes concernant la sécurité et le fonctionnement.

Information de Sécurité de la Batterie

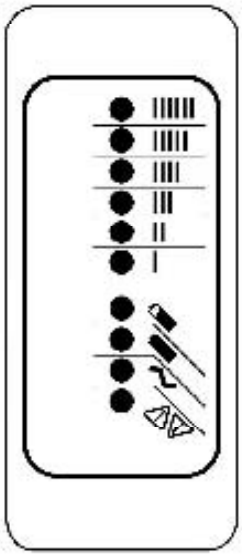
Attention: Utiliser le chargeur seulement sur les batteries avec un algorithme approprié au type spécifique de batterie. D'autres types de batteries pourraient éclater et causer des blessures ou dommages. Les batteries peuvent produire des gaz explosives en service normal. Ne jamais fumer près de la batterie et éviter toute étincelle ou flame nue à proximité de ces derniers. Fournisser la bonne ventilation lors du chargement. Ne jamais charger une batterie gelée. Prendre connaissance des mesures de précaution spécifiées par le fabricant de la batterie, p. ex., vérifier s'il faut enlever les bouchons des cellules lors du chargement de la batterie, et les taux de chargement recommandés.

Information de Sécurité Électrique

Danger: Risque de chocs électriques. Ne pas toucher les parties non isolées du connecteur de sortie ou les bornes non isolées de la batterie. Toujours connecter le chargeur à une prise de courant mise à la terre. Ne pas ouvrir ni desassembler le chargeur – referer toute reparations aux personnes qualifiés. Pas à l'usage des enfants.

Operating Instructions

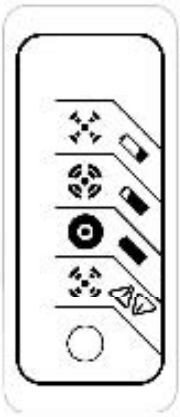
1. Always connect the charger to a **GROUNDED** outlet. When using an extension cord, avoid excessive voltage drops by using a grounded, 3-wire, 12-AWG cord no longer than 30m (100').
2. **AVOID** connecting a QuiQ charger and another device to a single 15A/20A circuit or the circuit may become overloaded.
3. Charger 10-LED Display



LED indications following "Power-On Self Test":

Ammeter (Amber)	**Solid:**	Displays approximate scale of current output during bulk phase.
	Flashing:	High internal charger temperature. Current output reduced. Also displays algorithm #1-6 for 11 seconds if no battery is connected.
80% Charge (Amber)	**Solid:**	Bulk charge phase complete, 80% charged In Absorption phase.
	Flashing:	With no battery connected, indicates algorithm # selected by number of flashes.
100% Charge (Green)	**Solid:**	Charging complete. Charger in Maintenance Mode.
	Flashing:	Absorption phase complete. In Finish phase
AC On (Amber)	**Solid:**	AC Power good
	Flashing:	Low AC Voltage, check voltage and extension cord length (max 100', 12-AWG).
Fault (Red)	**Flashing:**	Charger error. Reset charger power and refer to Troubleshooting below.

4. Optional Charger Single-LED Display (internal or external)



LED indications following "Power-On Self Test":

Green	**Solid:**	Charging complete. Charger in Maintenance Mode.
	Flashing:	*Short:* <80% Charge. *Long:* >80% Charge. *When battery is not connected:* Algorithm Number display.
Amber	**Flashing:**	Reduced Power Mode: Low AC Voltage or High internal charger temperature.
Red	**Flashing:**	Charger error. Reset charger power and refer to Troubleshooting below.

Maintenance Instructions

Maintenance Instruction #1 DOES NOT APPLY- PLEASE IGNORE

1. For flooded lead-acid batteries, regularly check water levels of each battery cell after charging and add distilled water as required to level specified by battery manufacturer. Follow the maintenance and safety instructions recommended by the battery manufacturer.

2. Make sure charger connections to battery terminals are tight and clean.

3. Do not expose charger to oil, dirt, mud or direct heavy water spray when cleaning vehicle.

Troubleshooting Instructions

If a fault occurs, count the number of red flashes between pauses and refer to the table below:

Red Flashes	Cause	Solution
✳	Battery High Voltage	Check battery size and condition and reset charger (interrupt AC power for 15 seconds).
✳✳	Battery Low Voltage	Check battery size and condition and reset charger (interrupt AC power for 15 seconds).
✳✳✳	Charge Timeout caused by battery pack not reaching required voltage. Charger output was reduced due to high temperatures	Check connections. Operate charger at a lower ambient temperature.
✳✳✳✳	Check Battery: battery could not be trickle charged up to minimum voltage	Check for shorted or damaged cells.
✳✳✳✳✳ ✳✳✳✳✳✳	Over-Temperature: Charger shut down due to high internal temperature. Charger Internal Fault	Ensure sufficient cooling air flow and reset charger (interrupt AC power for 15 seconds). Reset charger (interrupt AC power for 15 seconds). Return to qualified service depot if fault persists.

Installation Instructions

WARNING: The output of chargers with greater than 48V may pose an energy and/or shock hazard under normal use. These units must be installed in the host equipment in such a manner that the output cable and battery connections are only accessible with the use of a tool by qualified personnel.

Mounting:

1) Mount the charger with adequate ventilation. Ideally it will be mounted horizontally with airflow from below. If it will be mounted vertically, it is recommended that the DC-output cord be at the higher end of the charger.
2) Keep the charger free of oil, dirt, mud, or dust to keep the cooling fins operating as efficiently as possible.
3) Mount the charger by the mounting plate using appropriate fasteners. (ie. locking ¼" or M6 bolts)
4) For UL2202 compliance, a 12AWG green bonding wire must be attached from the stud located on the charger (see Figure 1) to the vehicle frame.
5) Install such that risk of human contact with hot surfaces is reduced.
6) The charger's AC plug must be located at least 18" above the ground and the display visible to the user.

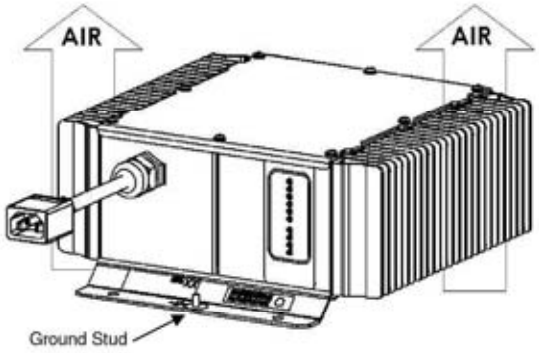


Figure 1: Charger Mounting

DC Battery Connection Procedure:

1) The green wire outputs battery voltage when the charger is not plugged into AC to provide an interlock function (see Figure 2).
   If used, a user-supplied 1A fast-blow external fuse must be installed in-line to prevent damage. Shorting or drawing more than 1A may damage charger and void the warranty.
2) Securely fasten the black ring terminal to the negative terminal ("-", or "NEG") of the battery pack.
3) Check that the correct charge algorithm is being used and change algorithm if necessary. Securely fasten the red ring terminal to the positive terminal ("+", or "POS") of the battery pack.

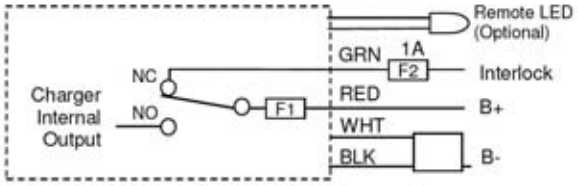


Figure 2: Charger Connections

Specifications

DC Output – see Operating Instructions

QuiQ Model: 912-	24xx	36xx	48xx	72xx
Voltage-nom (V)	24	36	48	72
Voltage-max (V)	33.6	50.4	67.2	100
Current-max (A)	25	21	18	12
Battery Type	Specific to selected algorithm			
Reverse Polarity	Electronic protection – auto-reset			
Short Circuit	Electronic current limit			

AC Input

All models	
Voltage-max (Vrms)	85 – 265
Frequency (Hz)	45 - 65
Current - max (Arms)	12A @ 104VAC (reduced by 20%<104V)
Current – nom (Arms)	10A @ 120VAC / 5A @ 230VAC
AC Power Factor	>0.98 at nominal input current

Mechanical

All models	
Dimensions	28.0 x 24.5 x 11.0 cm (11 x 9.7 x 4.3")
Weight	<5 kg (11 lbs) w/ standard cord
Environmental	Enclosure: IP46
Operating Temperature	-30°C to +50°C (-22°F to 122°F), derated above 30°C, below 0°C
Storage Temperature	-40°C to +70°C (-40°F to 158°F)
AC input connector	IEC320/C14 (requires 1.8m localized cord)
DC output connector	CPM specific w/ 12AWG wire

Operation

All models	
Battery Temperature Compensation	Automatic
Maintenance Mode	Auto-restart if V<2.1Vpc or 30 days elapse

Regulatory

Safety	
EN 60335-1/2-29	Safety of Appliances/ Battery Chargers
UL2202	EV Charging System Equipment
UL1564 2nd Ed.	Industrial Battery Charger
CSA-C22.2 No. 107.2	Battery Chargers- Industrial
Emissions	
FCC Part 15/ICES 003	Unintentional Radiators Class A
EN 55011	Radio disturbance characteristics (Class A)
EN 61000-3-2	Limits for harmonic current emissions
EN 61000-3-3	Limits of voltage fluctuations and flicker
Immunity	
EN 61000-4-2	Electrostatic discharge immunity
EN 61000-4-3	Radiated, radio-frequency, EMF immunity
EN 61000-4-4	Electrical fast transient/burst immunity
EN 61000-4-5	Surge immunity
EN 61000-4-6	Conducted immunity
EN 61000-4-11	Voltage variations immunity

Programming Instructions

The QuiQ charger is pre-loaded with charge algorithms for up to 10 battery types (see Table 1).

Alg #	Battery Type
43	Discover AGM
37	Trojan T105 DV/DT CP 42V pack w/ 48V charger
27	Crown CR-325
8	Concorde 10xAh AGM
7	J305 DV/DT CP
6	DEKA 8G31 Gel
5	Trojan 30/31XHS
4	US Battery USB2200
3	T105 DV/DT CP
1	Trojan T105

Table 1

Check Default Charge Algorithm

Enter Algorithm Display Mode:

1) Disconnect AC Power.
2) Remove positive lead from battery pack.
3) Apply AC power and the charger will display the algorithm number after the Power On Self Test:
   a. All algorithms will display as a series of flashes of the '80%' LED.
   b. Algorithms #1 - 6 will also be indicated by the Ammeter LEDs (see User's Guide).

Examples:

4) Algorithm number display repeats for 11 seconds, then Algorithm Display Mode ends.
5) Remove AC Power and reconnect positive lead.

Change Default Charge Algorithm

1) Enter Algorithm Display Mode (as above).
2) While Algorithm Number is displayed (for 11 seconds), touch positive lead to the battery pack positive terminal for 3.0 seconds (+/- 0.5s).
3) Remove lead from battery pack. Algorithm Number will increment.
4) To increment the Algorithm Number again, repeat Steps 2 and 3 within 30 seconds.
5) Touch positive lead to positive terminal and hold until relay clicks (>10 seconds). The new default algorithm is now stored.
6) Remove AC Power and check default algorithm (as above)

Contact your original equipment manufacturer if your battery pack is not supported by the charge algorithms loaded in your charger.

Product warranty is two years - please contact dealer of original equipment for warranty service.

Note: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Safety

General Safety Information

This guide is provided to assist the owner or operator of this Ruff & Tuff electric vehicle in the maintenance and safe operation of the vehicle. The warnings in this manual are not a replacement for good common sense and safe driving practices. Operators of the Ruff & Tuff electric vehicle should have a valid motor vehicle license. No one under 16 years of age should be allowed to operate a Ruff & Tuff electric vehicle.

Operating Safety

1) Always use your Ruff & Tuff electric vehicle in a responsible manner and maintain the vehicle in safe operating conditions.
2) Always read and observe all warnings and operation instruction labels affixed to the Ruff & Tuff electric vehicle.
3) Always follow all safety rules established in the area where you are operating the Ruff & Tuff electric vehicle.
4) Always use extreme caution when making sharp or blind turns.
5) Always apply brake to control speed on steep grades.
6) Always use extreme caution when traveling:
    a. In wet areas
    b. In blind spots
    c. Along loose terrain
    d. On uneven roads
    e. In traffic with other vehicles
    f. Near pedestrian areas.

Notes, Cautions, and Warnings

The following notations indicate important information. Failure to follow the warnings contained in this manual could result in serious injury or death.

NOTE

***NOTE*:** Condition that should be observed. This provides key information that makes procedures easier and clearer.

CAUTION

***CAUTION*:** Condition that may result in damage to the vehicle. Special precautions must be taken to avoid damage to the vehicle.

! WARNING !

***WARNING*:** Hazardous condition that could result in severe injury or death to the vehicle operator, a bystander, or a person inspecting or repairing the vehicle.

Safety

General Safety Practices

Steep Grade: ! WARNING !

In areas where steep grades exist, vehicle operations should be restricted to the designated vehicle pathways where possible, and shall be identified with a suitable warning giving the following information: “Warning, steep grade, descend slowly with one foot on the brake.”

Wet Areas: ! WARNING !

Wet grassy areas may cause a vehicle to lose traction and may affect stability. Wet areas should be chained or roped off to prevent vehicle operations or be identified by a suitable warning not to operate vehicles in this area due to wet terrain.

Sharp Turns, Blind Corners, and Bridge Approaches: ! WARNING !

Sharp turns, blind spots, bridge approaches, and other potentially hazardous areas shall be either chained or roped off to prevent vehicle operations or identified with a suitable warning to the operator of the nature of the hazard and stating the proper precautions to be taken to avoid the hazard.

Loose Terrain: ! WARNING !

Loose terrain may cause a vehicle to lose traction and may affect stability. Areas of loose terrain should be repaired if possible, or chained or roped off to prevent vehicle operation, or identified by a suitable warning to operators not to operate vehicles in this area due to loose terrain or possible hazardous conditions.

Pedestrian Areas: ! WARNING !

Areas where pedestrians and vehicles interfere shall be avoided whenever possible by rerouting the vehicle traffic or the pedestrian traffic to eliminate the interference. If elimination of the interference is not possible or is highly impractical, signs shall be erected warning pedestrian traffic and to drive slowly and use extreme caution.

Ventilation: ! WARNING !

During the charging process, we recommend lifting the seat bottom to allow more air flow and reduce heat build up.

Safety

Read and understand all labels located on this vehicle. For any questions on any of the information, contact a Ruff & Tuff representative for clarification.

Always replace any damaged or missing labels.

On steep hills it is possible for vehicles to coast at greater than normal speeds encountered on a flat surface. To prevent loss of vehicle control and possible serious injury, speeds should be limited to no more than the maximum speed on level ground. Limit speed by applying the service brake.

Catastrophic damage to the drive train components due to excessive speed may result from driving the vehicle above specified speed. Damage caused by excessive speed may cause a loss of vehicle control and is costly. This is considered abuse and will not be covered under warranty.

Use extra caution when towing the vehicle.

If the vehicle is to be used in a commercial environment, signs should be used to warn of situations that could result in an unsafe coasting condition.

Keep this manual as part of the permanent service record in case the vehicle should be resold.

Safety

The owner should check local and other applicable laws and regulations before operating.

SEVERE INJURY OR DEATH can result if you do not follow these instructions:

- Read this entire manual and all labels carefully and follow the operating procedures described.
- Only operate a Ruff & Tuff electric vehicle if you have had proper training or instruction.
- Follow these age recommendations:
  No one under 16 years of age should operate a Ruff & Tuff electric vehicle or be left without adult supervision.
- Be weary of passengers or pedestrians.
- Do not operate a Ruff & Tuff electric vehicle on a highway.
- Do not consume alcohol or drugs before or while operating this machine.
- Never operate at speeds too fast for your skills or the outdoor conditions. Always operate at a speed that is suitable for the terrain, visibility and operating conditions, and your experience.
- Never attempt wheelies, jumps, or other stunts.
- Inspect your vehicle every time it is used to make sure it is in safe operating condition. Follow the inspection and maintenance procedures and schedules described in this manual.
- Always keep both hands on the wheel during operation.
- Always drive at slower speeds and be cautious when operating on unfamiliar terrain. Be alert to changing terrain conditions at all times when operating a Ruff & Tuff electric vehicle.
- Do not operate your vehicle on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control the vehicle on such terrain. Be especially cautious of these kinds of terrain.
- Always follow proper procedures for turning as described in this manual. Practice turning at low speeds before attempting to turn at faster speeds. Do not turn at excessive speeds.
- Do not operate the vehicle on hills too steep for the vehicle or for your ability. Practice on smaller hills before attempting larger ones.
- Always follow safety procedures for climbing hills. Check the terrain carefully before you start up any hill. Never climb hills with excessively slippery or loose surfaces. Shift your weight forward. Never open the throttle suddenly or make sudden gear changes. Never go over the top of a hill at high speed.
- Always follow safety procedures for going down hills and for braking on hills. Check the terrain carefully before you start down any hill. Shift your weight backward. Never go down a hill at high speeds. Avoid going down a hill at an angle that could cause the vehicle to lean sharply to one side. Go straight down the hill where possible.

Safety

- Always follow proper procedures for crossing the side of a hill as described in this manual. Avoid hills with excessively slippery or loose surfaces. Shift your weight to the uphill side of the vehicle. Never attempt to turn the vehicle around on any hill until you have mastered the turning technique on level ground. Avoid crossing the side of a steep hill if possible.
- Use proper procedures if you stall or roll backwards when climbing a hill. To avoid stalling, use proper gear and maintain a steady speed when climbing a hill. If you stall or roll backwards, follow the special procedure for braking. Dismount on the uphill side or to a side if pointed straight uphill. Turn the vehicle around and remount.
- Always check for obstacles before operating in a new area.
- Never attempt to operate over large obstacles, such as large rocks or fallen trees.
- Be careful when skidding or sliding. Learn to safely control skidding or sliding by practicing at low speeds and on level, smooth terrain. On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding or sliding out of control.
- Never operate a Ruff & Tuff electric vehicle in fast flowing water or excessively deep waters. Contact with water may affect the brakes. Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water. If necessary, apply them several times to let friction dry out the linings.
- Always use the size and type tires specified in this manual.
- Always maintain proper tire pressure as described in this manual.
- Never modify a Ruff & Tuff electric vehicle through improper installation or use of accessories.
- Never exceed the stated load capacity for a vehicle. Cargo should be properly distributed and securely attached. Reduce speed and follow sound procedures for carrying cargo or pulling a trailer. Allow greater distance for braking.

Riding the Vehicle

Ride With Care and Good Judgment

Get Training If You Are Inexperienced

This Ruff & Tuff electric vehicle should only be used by experienced operators with valid motor license. This vehicle requires special skills obtained through practice. Take your time to fully learn techniques before attempting more difficult maneuvers.

You should familiarize yourself with the operation of the vehicle to achieve the skill necessary to enjoy riding safely. Be sure you have read this entire guide and understand the operation of the controls before you begin to ride. Pay particular attention to the safety information. Please also read all caution and warning labels on your Ruff & Tuff electric vehicle.

Beginners should get training from a certified instructor. Become familiar with this vehicle at slow speeds first, even if you are an experienced operator. Do not attempt to operate at maximum performance until you are totally familiar with the vehicle's handling and performance characteristics.

! WARNING !

Proper Instruction

Potential Hazard

Operating this vehicle without proper instruction

What Can Happen

The risk of an accident is greatly increased if the operator does not know how to operate the vehicle properly in different situations and on different types of terrain.

How to Avoid the Hazard

Beginning and inexperienced operators should complete a certified training course for the vehicle.

Riding your vehicle requires skills acquired through practice over a period of time. Take the time to learn the basic techniques well before attempting more difficult maneuvers.

Riding the Vehicle

! WARNING !

Age Recommendation

Not recommended for children under 16 years of age.

Potential Hazard

Failure to follow the age recommendations for this vehicle

What Can Happen

Use by children of vehicles that are not recommended for their age can lead to severe injury or death of the child.

How to Avoid the Hazard

A child under 16 should never operate a Ruff & Tuff electric vehicle.

! WARNING !

During Operation

Always keep your feet inside the vehicle during operation. Otherwise, your feet may contact the rear wheels.

Potential Hazard

Removing hands from steering wheel or feet from inside the vehicle during operation

What Can Happen

Removing even one hand or foot can reduce your ability to control the vehicle or could cause you to lose your balance and fall out of the vehicle. If you remove a foot from inside the vehicle, your foot or leg may come into contact with the rear wheels or objects outside the vehicle, which could injure you or cause an accident.

How to Avoid the Hazard

Always keep both hands on the steering wheel and both feet inside the vehicle during operation.

Riding the Vehicle

! WARNING !

Alcohol and Drug Use

Do not operate after consuming alcohol or drugs. Operator's performance capability is reduced by the influence of alcohol or drugs.

Potential Hazard
Operating this vehicle after consuming alcohol or drugs

What Can Happen
Could seriously affect your judgment.
Could cause you to react more slowly.
Could affect your balance and perception.
Could result in an accident.

How to Avoid the Hazard
Never consume alcohol or drugs before or while driving this vehicle.

! WARNING !

Pre-Operation Checks

Always perform Pre-Operation checks before riding for safety and proper care of the vehicle.

Potential Hazard
Failure to inspect the vehicle before operating

What Can Happen
Increases the possibility of accident or equipment damage.

How to Avoid the Hazard
Always inspect your vehicle each time you use it to make sure the vehicle is in safe operating condition.

! WARNING !

Tires and Tire Pressure

Potential Hazard

Operating this vehicle with improper tires, or with improper or uneven tire pressure

What Can Happen

Use of improper tires on this vehicle, or operation of this vehicle with improper or uneven tire pressure, may cause loss of control, increasing your risk of an accident.

How to Avoid the Hazard

Always use the size and type of tires specified in this guide for this vehicle.

Always maintain proper tire pressure per manufacturer's recommendation on tire's sidewall.

! WARNING !

Speed

Do not operate at speeds too fast for your skills or the conditions.

Potential Hazard

Operating this vehicle at speeds too fast for your skills or the conditions

What Can Happen

Increases your chances of losing control of the vehicle, which can result in an accident

How to Avoid the Hazard

Always go at a speed that is proper for the terrain, visibility and operating conditions, and your experience.

Riding the Vehicle

! WARNING !

Loading and Accessories

Use extra caution when riding the vehicle with additional loads, such as accessories or cargo. The vehicle's handling may be adversely affected. Reduce your speed when adding additional loads.

Potential Hazard

Overloading this vehicle or carrying or towing cargo improperly

What Can Happen

Could cause changes in vehicle handling which could lead to an accident

How to Avoid the Hazard

Never exceed the stated load capacity for this vehicle.
Cargo should be properly distributed and securely attached.
Reduce speed when carrying cargo or pulling a trailer.
Allow greater distance for braking.
Always follow instructions for carrying cargo or pulling a trailer.

! WARNING !

Seat Belts

Potential Hazard

Failure to properly wear seat belt while in the Ruff & Tuff electric vehicle

What Can Happen

Failure to properly wear seat belt can lead to potential injury or death of passenger.

How to Avoid the Hazard

Each passenger must always wear a seat belt while in the Ruff & Tuff electric vehicle.

Riding the Vehicle

! WARNING !

Wheelies and Jumping

Avoid wheelies and jumping. You may lose control of the vehicle or overturn.

Potential Hazard

Attempting wheelies, jumps, and other stunts

What Can Happen

Increases the chance of an accident, including an overturn.

How to Avoid the Hazard

Never attempt stunts, such as wheelies or jumps. Do not try to show off.

! WARNING !

Modifications

Potential Hazard

Operating this vehicle with improper modifications

What Can Happen

Improper installation of accessories or modification of this vehicle may cause changes in handling which in some situations could lead to an accident.

How to Avoid the Hazard

Never modify this vehicle through improper installation or use of accessories. All parts and accessories added to this vehicle should be genuine Ruff & Tuff Electric Vehicle Inc. products designed for use on this vehicle and should be installed and used according to instructions. If you have questions, consult an authorized Ruff & Tuff dealer.

Riding the Vehicle

! WARNING !

Road Restrictions

When attempting to ride on public road or street, always follow the restrictions and guidelines for this class of vehicle in the particular area you are riding in. These rules may vary from state to state. Never ride on any highway.

Potential Hazard

Operating this vehicle on highways

What Can Happen

You can collide with another vehicle.

How to Avoid the Hazard

Never operate this vehicle on any highway. In many states it is illegal to operate these vehicles on public streets, roads, and highways.

! WARNING !

Terrain

Know the terrain where you ride. Ride cautiously in unfamiliar areas. Stay alert for holes, rocks, or roots in the terrain, and other hidden hazards which may cause the vehicle to upset.

Potential Hazard

Failure to use extra care when operating this vehicle on unfamiliar terrain

What Can Happen

You can come upon hidden rocks, bumps, or holes, without enough time to react. This could result in the vehicle overturning or going out of control.

How to Avoid the Hazard

Go slowly and be extra careful when operating on unfamiliar terrain. Always be alert to changing terrain conditions when operating the vehicle.

! WARNING !

Terrain

Potential Hazard

Failure to use extra care when operating on excessively rough, slippery or loose terrain

What Can Happen

Could cause loss of traction or vehicle control, which could result in an accident, including an overturn.

How to Avoid the Hazard

Do not operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control the vehicle on such terrain. Always be especially cautious on these kinds of terrain.

! WARNING !

Visibility

Potential Hazard

Operating in areas where you might not be seen by other off-road vehicles

What Can Happen

You could be in a collision. You could be injured.

How to Avoid the Hazard

Watch carefully for other vehicles. Do not ride in areas posted "no trespassing". Do not ride on private property without getting permission.

! WARNING !

Climbing Uphill

Use proper riding techniques to avoid vehicle overturns on hills. Be sure that you can maneuver your vehicle well on flat ground before attempting any incline and then riding first on gentle slopes. Try more difficult climbs only after you have developed your skill. In all cases avoid inclines with slippery or loose surfaces, or obstacles that might cause you to lose control.

Potential Hazard

Operating on excessively steep hills

What Can Happen

The vehicle can overturn more easily on extremely steep hills as opposed to level surfaces or small hills.

How to Avoid the Hazard

Never operate the vehicle on hills too steep for the vehicle or for your abilities. Practice on smaller hills before attempting large hills. Always follow proper procedures for climbing hills as described in this guide.

Always check the terrain carefully before you start up any hill. Never climb hills with excessively slippery or loose surfaces. Shift your weight forward. The vehicle could tip over backwards. Never go over the top of any hill at high speed. An obstacle, a sharp drop, or another vehicle or person could be on the other side of the hill.

! WARNING !

Crossing and Turning on Hills

If you are climbing a hill and you find that you have not properly judged your ability to make it to the top, you should turn the vehicle around while you still have forward motion (provided you have the room to do so) and go down hill.

Potential Hazard

Improperly crossing hills or turning on hills

Riding the Vehicle

What Can Happen

Could cause loss of control or cause the vehicle to overturn.

How to Avoid the Hazard

Never attempt to turn the vehicle around on any hill until you have mastered the turning technique on level ground. Be very careful when turning on any hill. Avoid crossing the side of a steep hill if possible.

! WARNING !

Dismount

Potential Hazard

Stalling, rolling backwards, or improperly dismounting while climbing a hill

What Can Happen

Could result in vehicle overturning.

How to Avoid the Hazard

Use proper gear and maintain steady speed when climbing a hill.
If you lose all your forward speed:
Keep weight uphill. Apply the brakes. Lock the Park Brake, after you are stopped.
If you begin rolling backwards:
Keep weight uphill. Apply the brake.

! WARNING !

Riding Downhill

When riding your vehicle downhill, shift your weight as far to the rear and uphill side of the vehicle as possible. Move back on the seat and sit with your arms straight. Improper braking may cause loss of traction. Use caution while descending a hill with loose or slippery surfaces. Braking ability and traction may be adversely affected by these surfaces. Improper braking may also cause a loss of traction.

Potential Hazard

Going down a hill improperly

What Can Happen
Could cause a loss of control or cause the vehicle to overturn

How to Avoid the Hazard
Always follow proper procedures for going down hills. Always check the terrain carefully before you start down any hill. Shift your weight backward. Never go down a hill at high speed. Avoid going down a hill at an angle that would cause the vehicle to lean sharply to one side. Go straight down the hill where possible.

! WARNING !

Crossing a Slope

Traversing a sloping surface on your vehicle requires you to properly position your weight to maintain proper balance. Be sure that you have learned the basic riding skills on that ground before attempting to cross a sloping surface. Avoid slopes with slippery surfaces or rough terrain that may upset your balance.

As you travel across a slope, lean your body in the uphill direction. It may be necessary to correct the steering when riding on loose surfaces by pointing the front wheels slightly uphill. When riding on slopes, be sure not to make sharp turns either up or down hill.

If your vehicle does begin to tip over, gradually steer in the downhill direction if there are no obstacles in your path. As you regain proper balance, gradually steer again in the direction you wish to travel.

Potential Hazard
Improperly crossing hills or turning on hills

What Can Happen
Could cause a loss of control or cause the vehicle to overturn.

How to Avoid the Hazard
Never attempt to turn the vehicle around on any hill until you have mastered the turning technique on level ground. Be very careful when turning on any hill. Avoid crossing the side of a steep hill if possible. When crossing the side of a hill:
Always follow proper procedures as described in the Owner's Manual. Avoid hills with excessively slippery or loose surfaces. Shift your weight to the uphill side of the vehicle.

! WARNING !

Crossing through Shallow Water

The vehicle can be used to cross slow moving, shallow water of up to a maximum of 10 inches (25.4 cm) in depth for CEV2, CLX2, CLX4 and 4x4 and 6 inches (15.2 cm) in depth for the NEV2 and NEV4. Before entering the water, choose your path carefully. Enter where there is no sharp drop off, and avoid rocks or other obstacles which may be slippery or upset the vehicle. Drive slowly and carefully.

Potential Hazard

Operating this vehicle through deep or fast flowing water

What Can Happen

Tires may float, causing loss of traction and loss of control, which could lead to an accident.

How to Avoid the Hazard

Never operate this vehicle in fast flowing water or in excessively deep water. Remember that wet brakes may have reduced stopping ability. Test your brakes after leaving water. If necessary, apply them several times to let friction dry out the linings.

Test your brakes after leaving the water. Do not continue to ride your vehicle without verifying that you have regained proper braking ability.

After riding your vehicle in water, wash the vehicle in fresh water as if it has been operated in salt water or muddy conditions.

Riding the Vehicle

! WARNING !

Riding over Rough Terrain

Riding over rough terrain should be done with caution. Look out for obstacles which could cause damage to the vehicle or could lead to upset or accident. Be sure to keep both feet inside the vehicle at all times. Avoid jumping the vehicle as loss of control and damage to the vehicle may result.

Potential Hazard

Improperly operating over obstacles

What Can Happen

Could cause loss of control or a collision. Could cause the vehicle to overturn.

How to Avoid the Hazard

Before operating in a new area, check for obstacles.
Never attempt to ride over large obstacles, such as large rocks or fallen trees.
When you go over obstacles, always follow proper procedures as described in this guide.

! WARNING !

Sliding and Skidding

Care should be used when riding on loose or slippery surfaces since the vehicle may slide. If unexpected and uncorrected, sliding could lead to an accident.

If the rear wheels of your vehicle start to slide sideways, control can usually be regained (if there is room to do so on) by steering in the direction of the slide. Applying the brakes or accelerating is not recommended until you have corrected the slide.

With practice, over a period of time, skill at controlled sliding can be developed. The terrain should be chosen carefully before attempting such maneuvers, since both stability and control are reduced. Bear in mind that sliding maneuvers should always be avoided on extremely slippery surfaces such as ice, since all control may be lost.

! WARNING !

Sliding and Skidding

Potential Hazard

Skidding or sliding improperly

What Can Happen

You may lose control of the vehicle.

You may also regain traction unexpectedly, which may cause the vehicle to overturn.

How to Avoid the Hazard

Learn to safely control skidding or sliding by practicing at low speeds and on level, smooth terrain.

On extremely slippery surfaces, such as ice, go slowly and be very cautious in order to reduce the chance of skidding or sliding out of control.

Warranty Information

Limited Warranty

Ruff & Tuff Electric Vehicles, Inc. hereby warrants that new Ruff & Tuff electric vehicles purchased from an authorized Ruff & Tuff dealer in the continental United States will be free from defects in material and workmanship for the period of time stated herein, subject to certain stated limitations. Ruff & Tuff Electric Vehicles, Inc. is not responsible for any abuse, negligence, vandalism or acts of nature.

The Period of Warranty

Ruff & Tuff electric vehicles purchased by consumers shall have a warranty period of one year from the date of purchase. This one-year limited warranty extends only to the original purchaser and may not be transferred to subsequent purchasers. Vehicles used for commercial purposes have a warranty period of six months.

During the Period of Warranty

Any Ruff & Tuff dealer will, free of charge, repair or replace, at Ruff & Tuff's option, any part adjudged defective by Ruff & Tuff Electric Vehicle, Inc. during the warranty period due to faulty workmanship or material from the factory. Parts used in warranty repairs will be warranted for the balance of the vehicle's warranty period. All parts replaced under warranty become property of Ruff & Tuff Electric Vehicles, Inc.

General Exclusions

Exclusions from this warranty shall include any failures caused by:

a. Competition or racing use.
b. Installation of parts or accessories that are not qualitatively equivalent to genuine Ruff & Tuff parts.
c. Abnormal strain, neglect, or abuse.
d. Lack of proper maintenance.
e. Incorrectly performed maintenance and charging procedures.
f. Accident or collision damage.
g. Modification to original vehicle.
h. Damage due to improper transportation.

Specific Exclusions

Exclusions from this warranty shall include:

a. Parts replaced due to normal wear or routine maintenance; such as upholstery, tires, light bulbs, and brake shoes, etc.
b. Pick up and/or delivery of vehicle.

The Customer's Responsibility

Under this warranty the customer's responsibility shall be to:

a. Complete and return the warranty card included in this manual within ten (10) days from the date of purchase.
b. Operate and maintain the vehicle as specified in the appropriate owner's manual.
c. Give notice to an authorized Ruff & Tuff dealer of any and all apparent defects within ten (10) days after discovery.
d. Make the vehicle available at that time for inspection and repairs at such dealer's place of business.

Warranty Information

Ruff & Tuff Electric Vehicles, Inc. makes no other warranty of any kind, expressed or implied. All implied warranties of merchantability and fitness for a particular purpose which exceed the obligations and time limits stated in this warranty are hereby disclaimed by Ruff & Tuff Electric Vehicles, Inc. and excluded from this warranty.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Also excluded from this warranty are any incidental or consequential damages including loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

Any questions concerning warranty issues can be handled at your local dealer or contact:

Ruff & Tuff Electric Vehicles, Inc.
1 Ruff & Tuff Drive
Winnsboro, SC 29180

Toll-free: 1-800-997-3547
Contact Your Local Ruff & Tuff Dealer


800-997-3547
ruffandtuff.net