RIGHT HERE, RIGHT CARE

# NEXO

## Emergency Response Guide

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# Introduction



## Document Purpose

The purpose of this document is to familiarize emergency responders and the towing/roadside assistance industry with the proper methods to handle the Hyundai ΠEXO in an emergency situation. This guide offers a basic overview of key vehicle systems and provides instructions for dealing with the different types of situations encountered by emergency responders. The emergency response procedures for this vehicle are somewhat similar to a conventional vehicle, with additional information provided on dealing with the high-voltage electrical and hydrogen system.

## Vehicle Description

A hydrogen electric vehicle is a vehicle that generates electrical energy through a fuel cell system. While regular vehicles use an internal combustion engine and gasoline as fuel, hydrogen electric vehicles use electrical energy that is produced by the reaction of hydrogen and oxygen. As a result, hydrogen electric vehicles are eco-friendly since they do not emit exhaust gases.

When decelerating or driving downhill, regenerative braking is utilized to charge the high voltage battery. This minimizes energy losses and increases the range of the vehicle.

1. Powertrain (Stack)
2. High voltage battery
3. Hydrogen tank

## Fuel Cell Stack

Hydrogen electric vehicles, unlike regular internal combustion engine vehicles, use high voltage electrical energy generated in the fuel cell stack as a power source. Due to this high voltage electricity, the vehicle requires careful handling due to the high voltage hazard. The following items are safety guidelines of the high voltage in the fuel cell stack of NEXO.

1) A metal chassis and electro-conductive enclosure is located in the fuel cell stack to prevent an electrical shock due to the direct or indirect contact of users. The fuel cell stack has a high protection degree of IPXXB.

2) Live parts and high voltage buses, which are generating over 400V DC in the fuel cell stack, are designed to maintain a reliable insulation resistance with an electro-conductive enclosure. When the insulation resistance is lower than a specified value, the user is notified and the output current of fuel cell stack is limited.

## High Voltage Battery System

This system supplies the energy which is applied during vehicle acceleration. The system is also used to store the energy generated during regeneration braking.

1) The high voltage system is located in trunk area and is protected with a steel case.

2) The system consists of 64 cells. Each cell is sealed with an aluminum case to protect against an electrolyte spillage. There is a rare possibility that the electrolyte in the cell will spill, even if the battery module is cracked.

3) For safety, an over-current protection and ceramic coating isolation layer are used.

4) Non-flammable electrolyte material is used to prevent explosions or fire in an emergency case such as a car accident.

5) High voltage cables (orange color) connect the battery system to the DC converter.

6) There is a high voltage regulator used to control the high voltage line. In addition, a high voltage fuse and a safety plug are used to separate the electrical sources in the system for safety.

## General Characteristics of Hydrogen

Hydrogen is a gas with the smallest molecular weight of all gasses. It is colorless, odorless, tasteless, and noncorrosive with combustibility and fast diffusivity. It needs to be handled with caution.

However, hydrogen is not dangerous in any other way and could even be less dangerous than other fuels in some aspects. Since hydrogen is the lightest element , it rapidly rises and disperses in the atmosphere without mixing with the air. Hydrogen is relatively safe as it does not easily reach the concentration for explosion.

## Hydrogen Gas Features

A hydrogen gas leak should be prevented to minimize the hazard of ignition or detonation.

The followings are properties of gaseous hydrogen.

▪ It has the lowest molecular weight, and is the smallest molecule of any element.

▪ It has the lowest density and the highest buoyancy of any element.

▪ It can cause brittleness in some materials, including metals (materials chosen for hydrogen applications are not susceptible to brittleness).

▪ It is colorless, odorless and tasteless.

▪ It burns invisibly and without smoke.

▪ It has the lowest ignition energy of any fuel (less than one-tenth that of other fuels).

▪ It has a wide flammability concentration range of 4% to 75%

Diffusion Velocity Ratio of Diffusion and Flow in the air

| Gas | $CH_4$ | $C_3H_8$ | $H_2$ |
|---|---|---|---|
| Diffusion | 1.0 | 0.63 | 3.8 |
| Turbulent Flow | 1.0 | 0.6 | 2.83 |

## Hydrogen Gas Leak Detection System

The hydrogen gas detection sensor detects a hydrogen leak. If there is a leak, the hydrogen storage system and electrical systems will be shut down. Sensors will illuminate a waring light when concentrations reach the minimum flammability limit of hydrogen.

Sensors are installed at the fuel cell stack, fuel suppling system, and in between the hydrogen storage tank and the ceiling of vehicle. These sensors detect a hydrogen leak under emergency situations, allowing the system to block the hydrogen.

The NEXO uses approximately 250 ~ 450 DC voltage and high pressure hydrogen gas. Be sure to follow the safety instructions below. Failure to follow the safety instructions may result in serious injury or death.

**[Safety precautions for the hydrogen system]**

NOTICE

From a safety point of view, hydrogen gas leaks should be prevented due to the possibility of ignition or detonation.

The followings are properties of gaseous hydrogen.

- It has the lowest molecular weight, and has the smallest molecules of any element.
- It has the lowest density and the highest buoyancy of any element.
- It can cause brittleness in some materials, including metals (materials chosen for hydrogen applications are not susceptible to brittleness).
- It burns invisibly and without smoke.
- It has the lowest ignition energy of any fuel (less than one-tenth that of other fuels).
- It has a wide flammability concentration range of 4% to 75%

WARNING

- Ignition sources should not be near the vehicle. For example, exposed flame, sparks, electrostatic discharge or hot surfaces that could cause hydrogen gas to ignite.
- Caution labels for hydrogen are attached to the hydrogen storage system components. The hydrogen storage system is composed of two cylinders and are filled with hydrogen gas. Each tank is made of aluminum and covered with carbon fiber, which allows the storage tank to sustain high pressures. This cylinder contains flammable gas under high pressure. Serious injury or death can result from improper installation, lack of maintenance or overfilling. Do not attempt to remove this cylinder or any of its fittings from this vehicle. It may contain residual gases under pressure, which could cause a fire or explosion.

**[Safety precautions for the high voltage system]**

WARNING

- Warning labels for high voltages are attached to the high voltage components. The color of the high voltage cables and connectors are orange. Do not touch any of these high voltage components, cables, and connectors without proper Personal Protection Equipment (PPE).

## General Vehicle Description

The Hyundai NEXO hydrogen electric vehicle is built on a chassis specifically developed to handle the fuel cells. The safest method is to assume that the NEXO you respond to is equipped with high voltage and hydrogen systems because the NEXO is an exclusive hydrogen electric vehicle model. Using the information provided in this section, responders will be able to identify the NEXO.

## Identifying a Hyundai NEXO Vehicle

### 'NEXO' on the trunk and the Blue Drive badge on the side of vehicle

The Hyundai NEXO can be easily identified by the 'NEXO' and the 'Fuel Cell' badge located on the trunk lid and the 'BLUE-DRIVE' badge on the left side of the vehicle.

**DANGER** **Electrocution Risk!**

Badging can become hidden after a crash due to damage to the vehicle. Always be sure to utilize additional methods as necessary to identify the vehicle if there is no badge present.

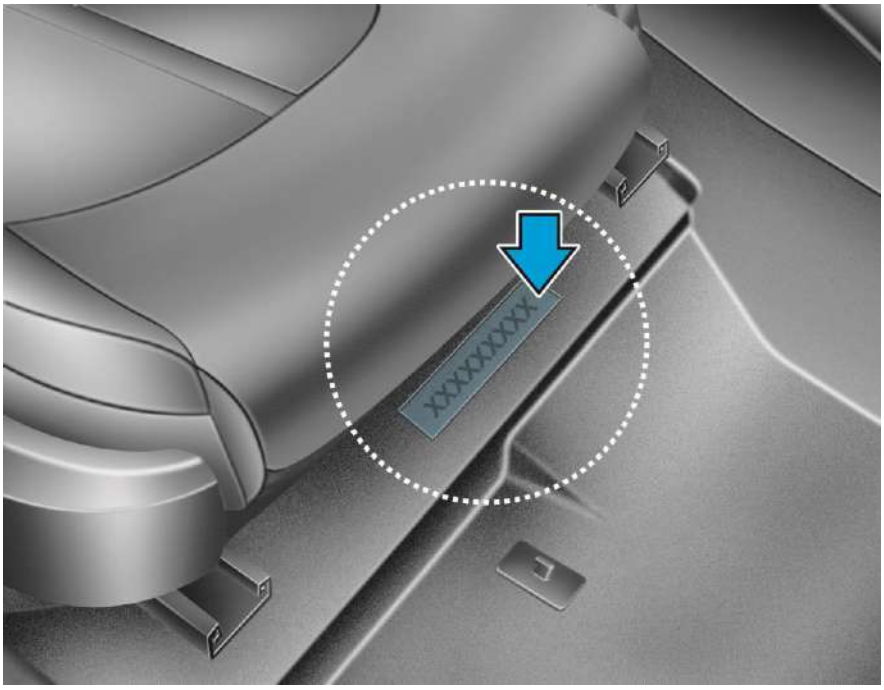
## VIN Number

The Vehicle Identification Number (VIN) identifies an electric vehicle with a “6” displayed in the 8th position, as shown in the below drawing.

The VIN is embedded on the floor under the passenger seat. The number “6” in the 8th character of the VIN indicates that it is an electric vehicle with batteries [LiPB 240 V, 6.5 Ah] and a motor [3-phase AC 113 kw].

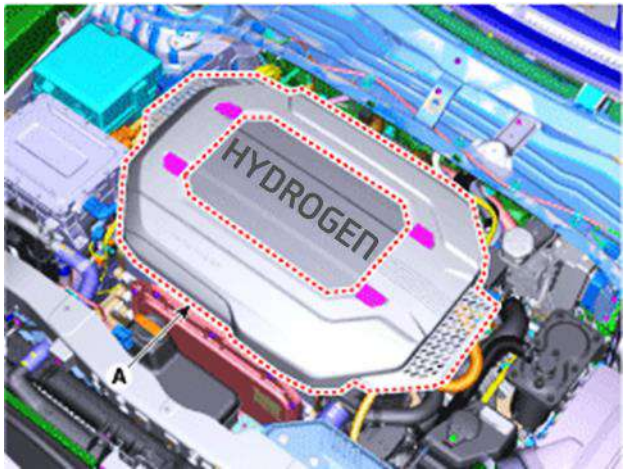
XXXXXXX6XXXXXXX

8th digit



### Fuel Cell Power Module Compartment

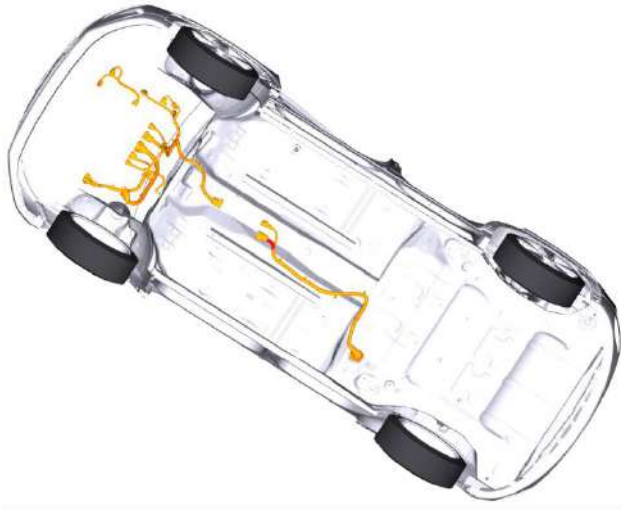
The NEXO has a fuel cell stack cover with "HYDROGEN" clearly shown on it.




Additionally, there are orange colored high-voltage electrical cables in the fuel cell power module compartment.

### Vehicle Underside

Orange colored cables are hidden by the under cover. Some remain visible on the underside of the vehicle. This cable runs from the rear of the vehicle to the fuel cell power module compartment.



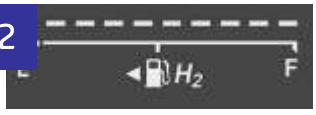
## Hydrogen Electric Vehicle – Cluster Instrument Panel

The instrument cluster panel displays the vehicle's specific features that identify the NEXO as a hydrogen electric vehicle.

1

: Regeneration brake/ECO/power gauge

2




: Hydrogen fuel gauge indicates the approximate amount of fuel remaining in the fuel tank

3

: The "**Ready**" Light indicates the vehicle is ready for driving.

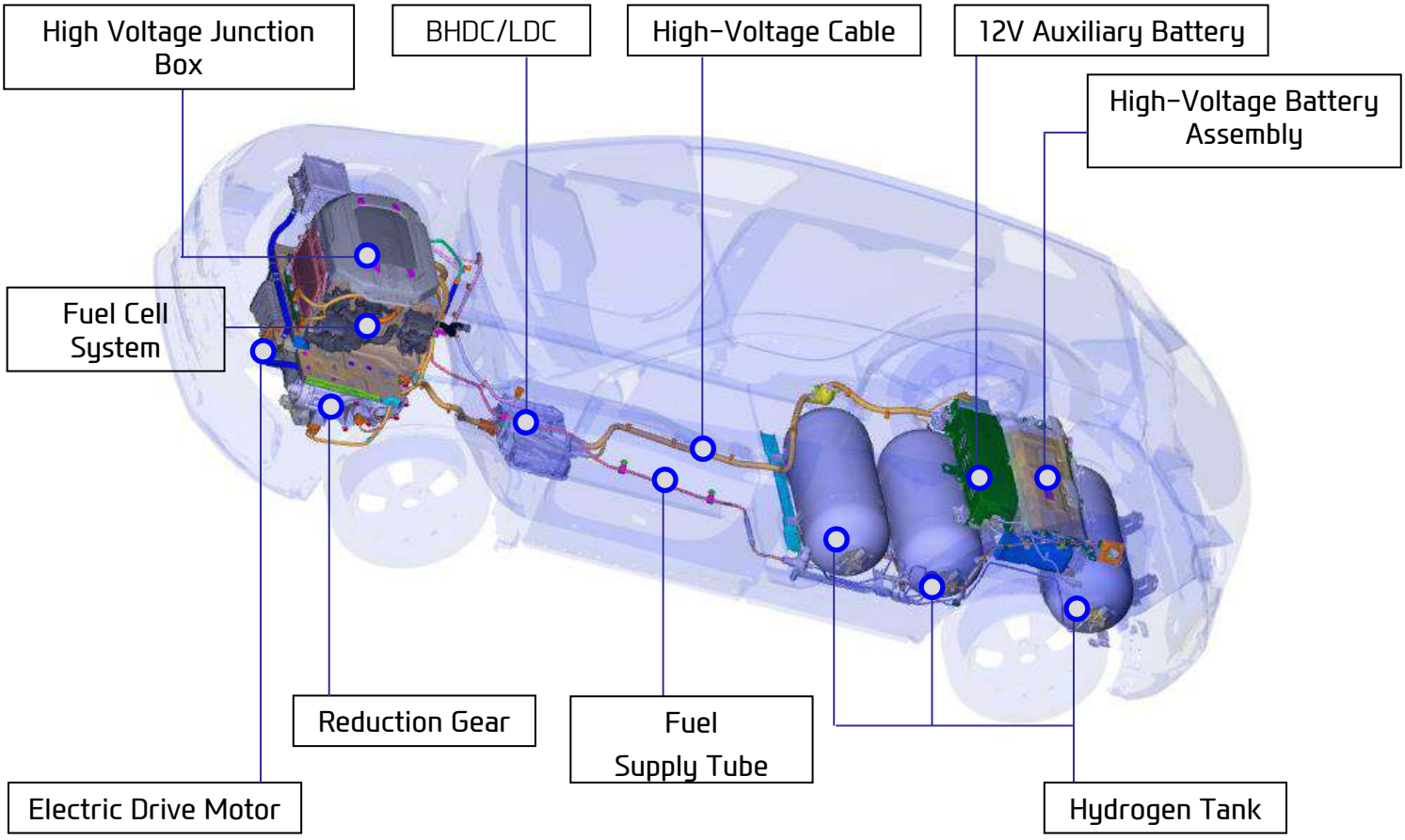
4

: Power Down Warning Light indicates that there may be a malfunction with the fuel cell stack. When it comes on during driving, the vehicle power will be limited.

## Key Specifications

| Item | | Value |
|---|---|---|
| Electric Driving Motor | Type | Permanent Magnet Synchronous Motor |
| | Max. Output (kW) | 113 |
| | Max. Torque (Nm) | 395 |
| Reduction Gear | Gear Ratio | 7.981 |
| Inverter | Input Voltage (V) | 240~450V |
| BHDC | Input Voltage (V) | 160~275.2V |
| | Output Voltage (V) | 250~450V |
| LDC | Input Voltage (V) | 250~450V |
| | Output Voltage (V) | 12.8~13.9V |
| Hydrogen Fuel Tank | Capacity ( ℓ ) | 156.6 (52.2 x 3) |
| Stack | Max. Output (kW) | 95 |
| | Output Voltage (V) | 250~450V |
| High Voltage Battery | Type | Lithium-ion polymer |
| | Rated Voltage (V) | 240 |
| | Capacity (Ah) / Energy (kwh) | 6.5 / 1.56 |
| | Weight (kg) | 51.2 |

## Vehicle Components Location

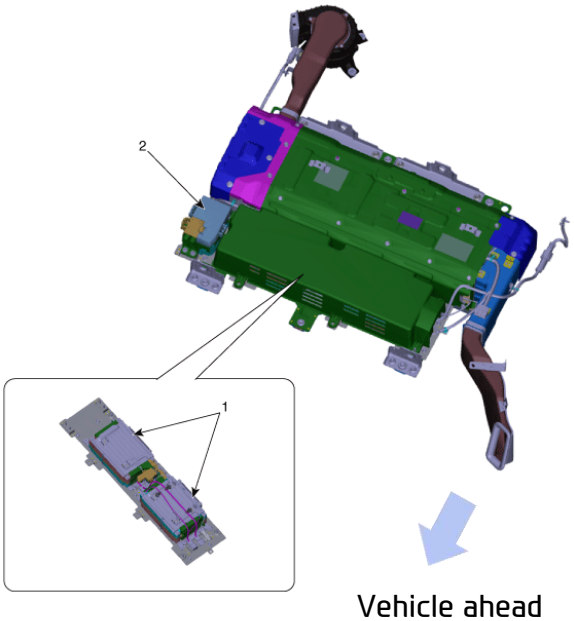



| | |
|---|---|
| Fuel Cell System | Creates electric energy through an electro-chemical reaction between the hydrogen and oxygen |
| Hydrogen Tank | Stores hydrogen fuel |
| LDC | Low Power DC-DC Converter:<br>Charge the 12V supplementary battery |
| Inverter | DC → AC (from battery or fuel cell stack to drive motor)<br>AC → DC (charge using regenerative braking) |
| High Voltage Junction Box | Supplies electricity from the battery to the inverter, LDC, air conditioner compressor, and other systems |
| BHDC | Converts voltages among high-voltage battery , fuel cell stack and inverter |
| Electric Drive Motor | Generates a rotating magnetic field and generates motor torque when current flows through the coil |
| Reduction Gear | Increases motor torque and the amount of torque transferred to the wheels |
| High-Voltage Battery Assembly | Supplies electric energy to drive the motor and stores generated electric energy |

## Vehicle Components

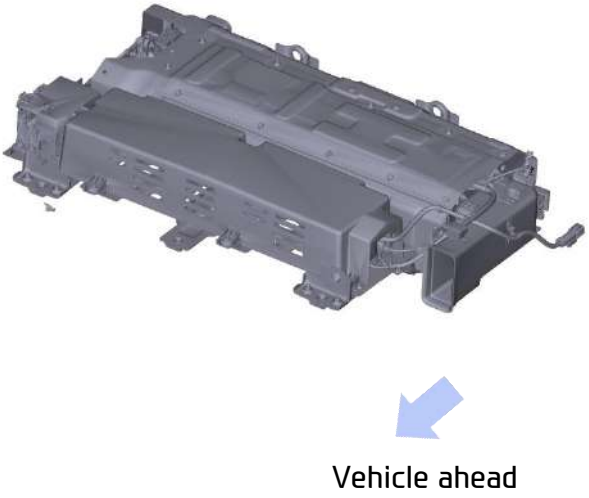
### 12V Auxiliary Battery

The 12V Lithium-ion polymer auxiliary battery is located in front of the high-voltage battery in the trunk. This battery supplies power to all the standard electric devices such as the audio and instrument cluster. Also, the battery supplies power to the control unit which controls the flow of the high-voltage current and supply of hydrogen.



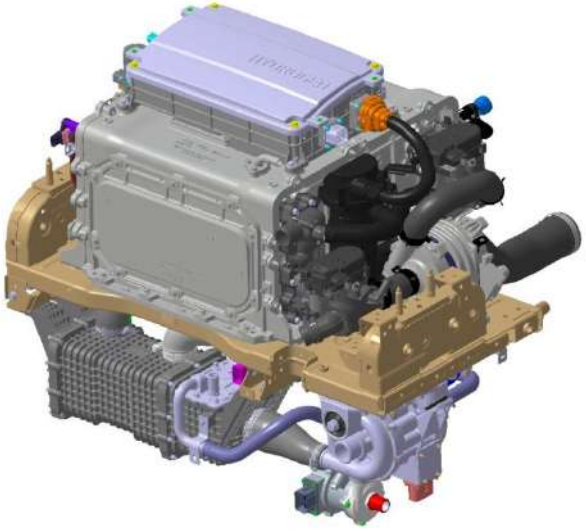

### High-Voltage (HV) Battery

The Lithium-ion Polymer HV battery contains a gel electrolyte and is made up of 64 cells (3.75V each), wired in series for a nominal voltage of 240V with 6.5 Ah of capacity. The battery is located in the trunk area.




### Fuel Cell System

The fuel cell system is composed of 1) the fuel cell which generates electric energy through a electro-chemical reaction between the hydrogen and oxygen, 2) the hydrogen supply system which supplies the hydrogen (fuel), 3) the heat control system which manages the heat and 4) the air supply system which supplies oxygen. The electricity generated by the fuel cell system powers the high-voltage battery and the electric motor and makes the vehicle move.

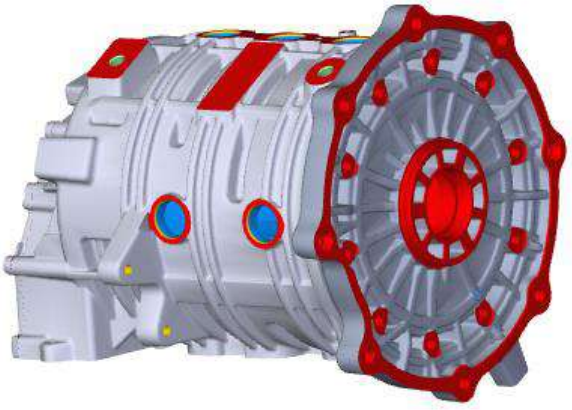


## Motor Control Unit

The inverter coverts the direct current of the high-voltage battery to alternative current and supplies it to the driving motor. Also, the inverter converts the alternative current of the regenerative braking to the direct current to recharge the high-voltage battery. The inverter is equipped with a Motor Control Unit (MCU) to control the motor torque. When dealing with the high-voltage related items, please wait 5 to 10 minutes to allow the high-voltage capacitor in the inverter to discharge.

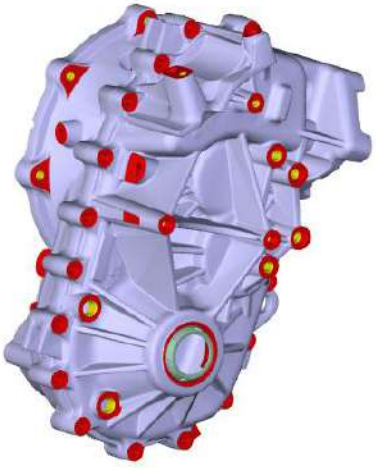
## Electric Drive Motor

Mounted in fuel cell power module compartment with the gear reduction unit, the Electric Drive Motor is used for vehicle propulsion. During deceleration or braking, it acts as an alternator and charges the high-voltage battery by converting the vehicle's kinetic energy into electrical energy.



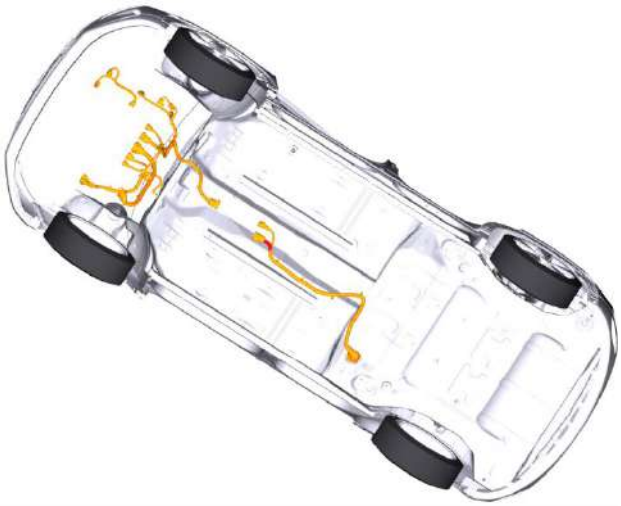
## Gear Reduction Unit

The Gear Reduction Unit increases motor torque and transfers it to the wheels, with a maximum torque output of 395Nm.



## High-Voltage Cabling

The high-voltage cabling in the NEXO is orange per the SAE standard. These cables run from the rear of the vehicle to the front, where they connect the high-voltage battery to the Electric Drive Motor and other high-voltage components.



**WARNING** **Electrocution Risk!**

- Never cut or disconnect the high voltage orange cabling and connectors without first disabling the system by removing the safety plug.
- Exposed cables or wires may be visible inside or outside the vehicle. Never touch the wires, cables, connecters, or any electric components before disabling the system, to prevent injury or death due to electrical shock.

Failure to follow these instructions can lead to death by electrical shock.

## Safety Plug

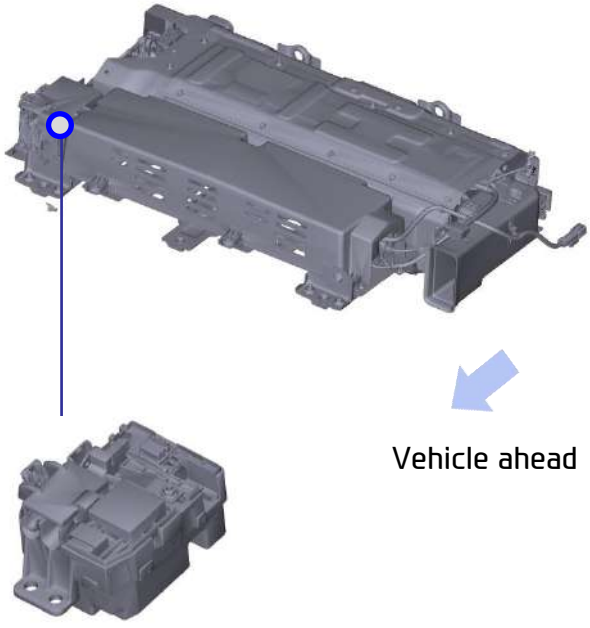
When dealing with high-voltage components related to the high-voltage battery, make sure to remove the safety plug before servicing. After the safety plug is removed, please wait 5 to 10 minutes to allow the high-voltage capacitor in the inverter to discharge.

## High-Voltage Electrical Isolation

Unlike the 12V electrical system that is grounded to the vehicle's chassis, the NEXO's high-voltage electrical system is designed to be isolated from the vehicle.

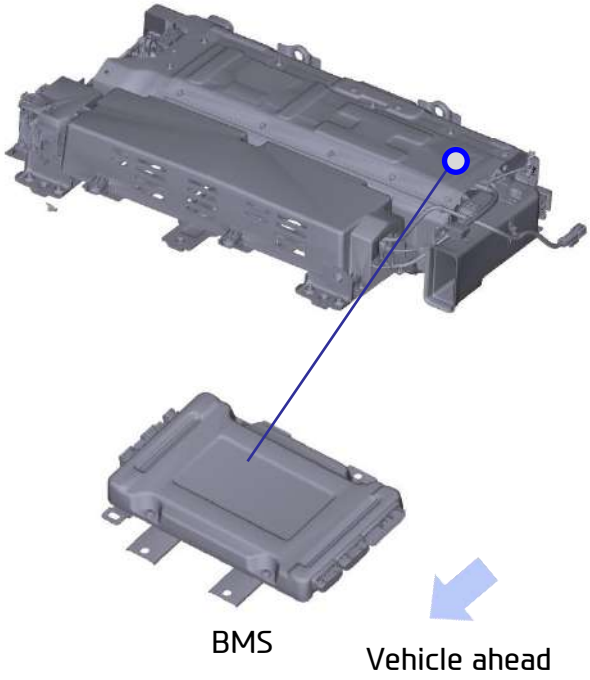
## Regulation of High-Voltage Electrical Current

Current from the high-voltage battery is controlled by the Power Relay Assembly (PRA), which consists of the positive and negative main relays, a pre-charge relay, pre-charge resistor, and the battery current sensor. The PRA is mounted in the front side of the high-voltage battery pack assembly and controls the high-voltage power circuit between the high-voltage battery and the Electric Power Control Unit.




## High-Voltage Safety System

There are multiple safety systems incorporated into the NEXO. The system that protects the high-voltage electrical system is called the Battery Management System (BMS). The BMS is located inside the Power Relay Assembly and measures several parameters to maintain the optimal performance of the high-voltage battery. It controls the battery cooling fan to ensure proper battery operation. In addition, if a system fault occurs, the BMS turns off the PRA to protect the system.



## Airbag System (SRS : Supplemental Restraint System)

### Airbag

Six airbags are installed in the NEXO as shown below. Before starting any emergency procedure, make sure that the vehicle ignition is turned off and disconnect the negative cable from the 12V auxiliary battery to prevent accidental deployment of airbags. (Refer to page 20)

*** The actual air bags and seats in the vehicle may differ from the illustration**

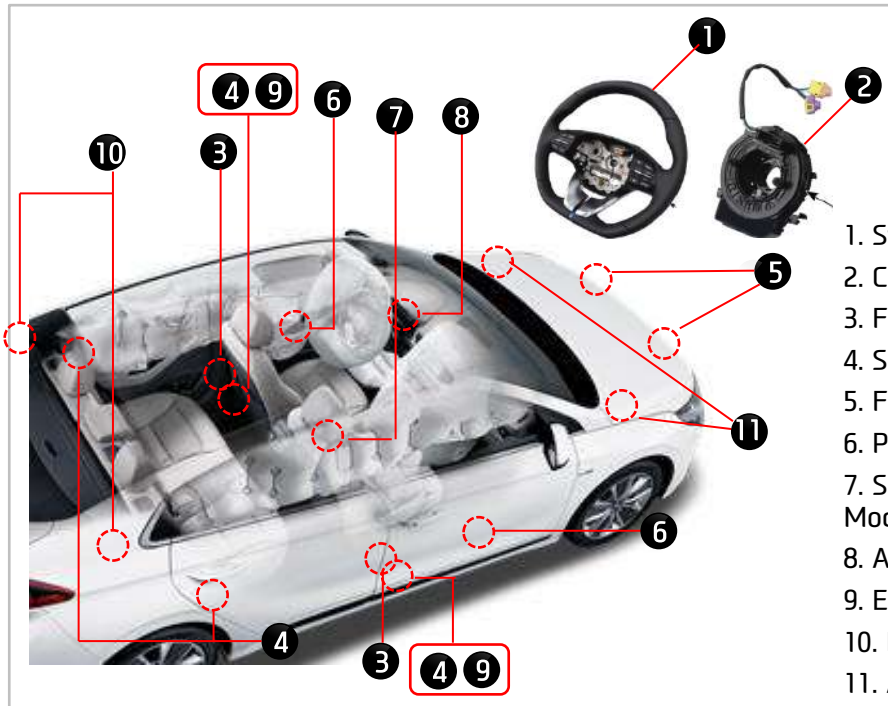
| Number | Name | Location |
|---|---|---|
| 1 | Driver's front airbag | Driver side |
| 2 | Passenger's front airbag | Passenger side |
| 3, 4 | Side airbag | Driver / Passenger side |
| 5, 6 | Curtain airbag | Driver / Passenger side |

### Seat Belt Pretensioners

The ΠEXO is equipped with seat belts with pretensioners. When the seat belt pretensioners are activated in a collision, a loud noise may be heard and fine dust, which may appear to be smoke, may be visible in the passenger compartment. These are normal operating conditions and are not hazardous. The seat belt pretensioner assembly mechanisms may become hot during activation, and may need several minutes to cool after they have been activated.

### Sensors and Control Module

The airbags and pretensioners are managed by the SRS Control Module, or SRSCM, which is located below the front of the center console. In addition, there are four side impact sensors : two conventional accelerometer sensors in the B-pillars, and two pressure sensing sensors inside of the front door modules. Their locations are illustrated in the image below.




1. Steering Wheel
2. Clock Spring
3. Front Seat Belt Pretensioner (FBPT)
4. Side Impact Sensor (GSIS)
5. Front Impact Sensor (FIS)
6. Pressure Side Impact Sensor (PSIS)
7. Supplemental Restraint System Control Module (SRSCM)
8. Airbag Warning Lamp
9. Emergency Fastening Device (EFD)
10. Rear Seat Belt Pretensioner (RBPT)
11. Active Hood System

**WARNING**

- Do not cut through any component.
- SRS components may remain powered and active for up to 3 minutes after the 12V electrical system is shut off or disabled. Disconnect the battery negative cable and wait for at least 3 minutes before beginning any work.

Failure to follow any of these instructions may result in serious injury or death from accidental deployment of the airbag system.

## Initial Response:

The following procedures should be used whenever you are dealing with a NEXO at an emergency scene. All other operations should be consistent with your department's standard operating procedures or guides. Hydrogen electric vehicles damaged by a crash may have compromised high voltage safety systems and present a potential high voltage electrical shock hazard. Exercise caution and wear appropriate personal protective equipment (PPE) and safety gear, including high voltage safety gloves and boots. Remove all metallic jewelry, including watches and rings.

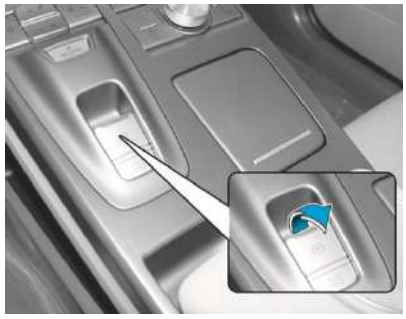
### Identify

When dealing with a NEXO at the scene of an accident, emergency responders should always assume that it is a electric model until it can be proven otherwise using the identification features outlined in this ERG. External badging will usually be the first clue but it can often be hidden by damage caused in a crash. Always be sure to inspect multiple sides of the vehicle as well as using the clues found under the hood and in the interior of the vehicle.

### Immobilize

The first step is to immobilize the vehicle to prevent any accidental movement that can endanger the emergency response personnel and any crash victims. Since the NEXO doesn't have an engine, there will be instances where the vehicle appears to be off because of the absence of engine noise. When in its "ready" mode, the vehicle can move almost silently using the electric drive motor. Responders should approach the vehicle from the sides and stay away from the front or rear as they are both potential paths of travel. Instructions for immobilizing the vehicle are shown below.

Chock the Wheels



Engage Parking Brake

Position the shift lever in park (P)

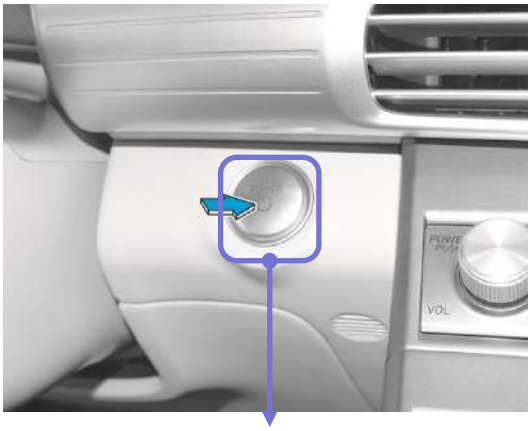
## Disable

The next step in the initial response process, conducted after the vehicle is secured to prevent movement, is to disable the vehicle, its SRS components and the high voltage electrical system. To prevent current flow through the system, use one of the following procedures to disable the vehicle.

### I . Disabling the system – Smart Key System and "POWER" START/STOP BUTTON

1. Check the status of the READY light on the instrument panel. If the READY light is illuminated, the vehicle is on. (Refer to page 8)

   a) If the READY light is NOT illuminated, the vehicle is off, Do not push the "POWER" START/STOP button because the vehicle may start.



"POWER" START/STOP Button

b) To turn off the system, put the shift lever in the P (Park) position and press the POWER button beside the shift lever.

**Without depressing the brake pedal**

| Pressing POWER button | Button Position | Vehicle condition |
|---|---|---|
| | OFF | Off |
| One time | ACC | Electrical accessories are operational. |
| Two times | ON | The warning lights can be checked before the vehicle is started. |
| Three times | OFF | Off |

**Depressing the brake pedal while a shift lever is in the P (Park) position**

| Pressing POWER button | Button Position | Vehicle condition |
|---|---|---|
| | OFF | Off |
| One time | - | Ready to drive |

**NOTICE**

- To turn off the vehicle in an emergency while driving, hold the start button for over 2 seconds or press the button three times within 3 seconds. The vehicle will turn off and switch to 「ACC」 status. While driving, it is possible to turn on the vehicle again by placing the shift gear in N (Neural) without depressing the brake. Never turn off the vehicle during normal driving.

2. Before disconnecting the 12V battery, move the smart key at least 2 meters away from the vehicle to prevent accidental starting.

Smart Key

3. Disconnect the negative (-) 12V battery cable (A), located in the motor compartment, to further prevent the risk of accidental starting.

**NOTICE**

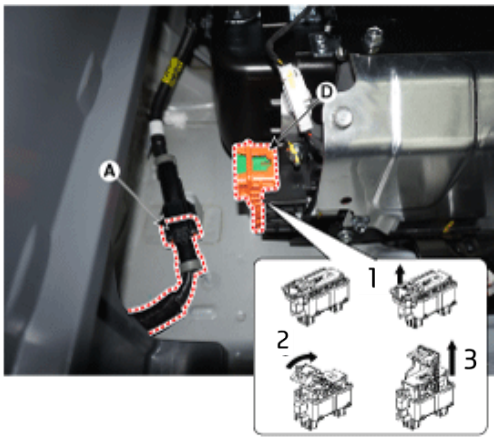
If necessary, lower the windows, unlock the doors and open the trunk as required before disconnecting the 12V battery. Once the 12V battery is disconnected, power controls will not operate.

4. Use the following procedures to remove the safety plug and disable the high voltage battery:

a) Remove the safety plug cover (A) located in the trunk.

b) Remove the safety plug using the following procedure :

**1: Unlock → 2 : Release → 3: Remove**

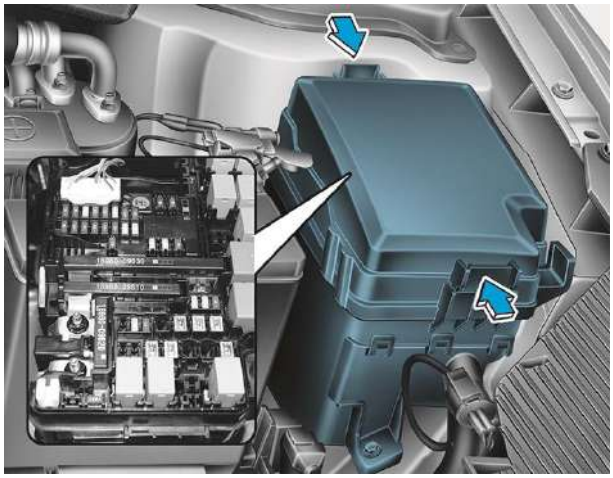



**WARNING**

- Even after the safety plug is removed, please wait for 5 to 10 minutes in order to discharge the high-voltage capacitor located in the inverter.

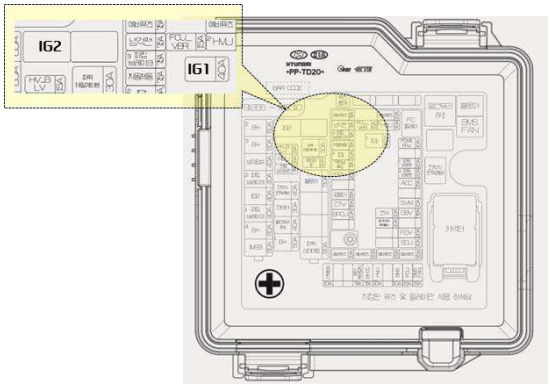
## II. Disabling the system – IG Relay Removal (Alternate Method)

1. Open the hood.



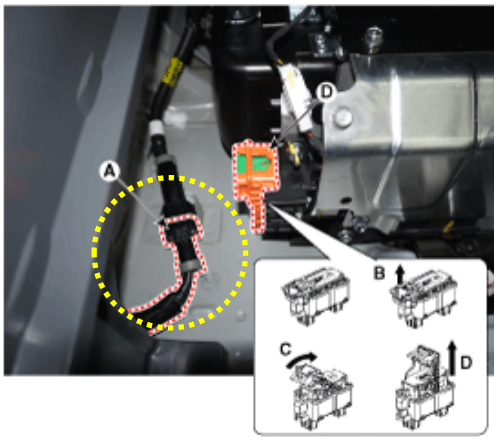
2. Remove the fuel cell power module compartment fuse box cover.

3. In the event the vehicle cannot be disabled using the “Power” START/STOP Button, pull the IG1, IG2 fuses or relays from the motor compartment room fuse box. If the IG fuses cannot be located, pull out all the fuses and relays in the fuse box.




Fuel Cell Power Module Fuse Box

4. Disconnect the negative (-) 12V battery cable (A), located in the motor compartment, to further prevent the risk of accidental starting.




**NOTICE**

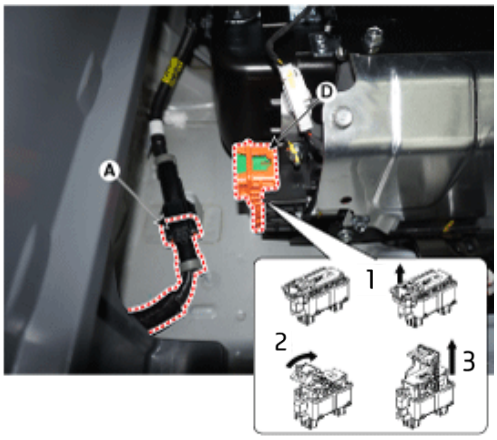
If necessary, lower the windows, unlock the doors and open the trunk as required before disconnecting the 12V battery. Once the 12V battery is disconnected, power controls will not operate.

5. Use the following procedures to remove the safety plug and disable the high voltage battery:

a) Remove the safety plug cover (A) located in the trunk.

b) Remove the safety plug using the following procedure :

1: Unlock → 2 : Release → 3 : Remove




**WARNING**

- Even after the safety plug is removed, please wait for 5 to 10 minutes in order to discharge the high-voltage capacitor located in the inverter.

If either method of disabling system is not completed, the vehicle will be prone to accidental deployment of airbags and electric shock from high-voltage components.

**WARNING** **Electrocution Risk!**

- Before engaging in emergency response procedures, ensure the vehicle is disabled and wait for more than 5 minutes to allow the capacitor in the high voltage system to discharge to avoid electrocution.
- Exposed cables or wires may be visible inside or outside the vehicle. To prevent injury or death due to electrical shock, never touch the wires or cables before disabling the system, to prevent injury or death due to electrical shock.

Failure to follow any of these instructions may result in serious injury or death by electrocution.

**WARNING** **Explosive Risk!**

- Do not cut through any component.
- SRS components may remain powered and active for up to 3 minutes after the 12V electrical system is shut off or disabled. Disconnect the battery negative cable and wait for at least 3 minutes before beginning work.

Failure to follow any of these instructions may result in serious injury or death from accidental deployment of the airbag system.

## Extrication Operations

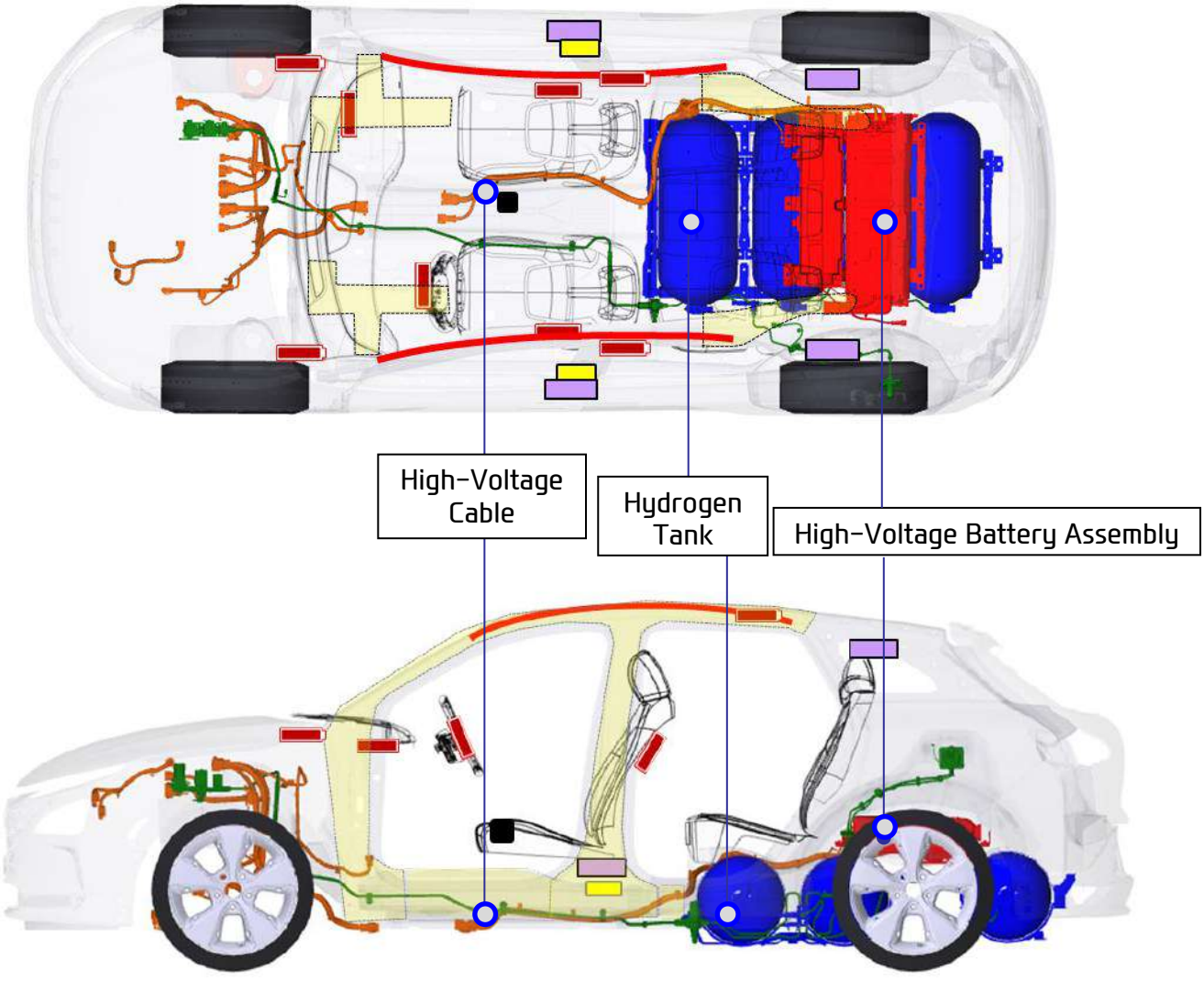
The extrication operations for the NEXO are similar to the conventional vehicle. However, the first responder should pay special attention when they extract occupants in the vehicle. Before extrication operations, the first responders should carry out “Initial Response: Identify, Immobilize and Disable” procedure section in pages 17 to 22.

### Vehicle Stabilization

Use standard stabilization (cribbing) points, as shown. Always be sure to connect to a structural member of the vehicle and avoid placing cribbing under high voltage cables, fuel lines and other areas not normally considered acceptable.

### Extrication tools and procedure

When responding to an incident involving a NEXO, we recommend that the first responders follow their organization's standard operating procedures for assessing and dealing with vehicle emergencies. When the first responders cut the vehicle, they should always pay special attention to the airbag system, orange colored high voltage cables and other high voltage components to avoid damage to these parts, which may increase the risks of explosion.



## Submersion

Some emergency responses can involve a submerged vehicle. A NEXO that is submerged does not have high-voltage components on the vehicle's body or framework. It is safe to touch the vehicle's body or framework if there is no severe damage to the vehicle, whether it is in water or on land.

In the event the vehicle is submerged or partially submerged, remove the vehicle from the water before attempting to disable the vehicle. Drain the water from the vehicle. Use one of the methods described in sections of pages 17 to 22 to disable the vehicle.

**WARNING**

- If severe damage causes high-voltage components to become exposed, responders should take appropriate precautions and wear appropriate insulated personal protective equipment.
- Do not attempt to remove the safety plug while in the water

Failure to follow any of these instructions may result in serious injury or death by electrocution.

## Vehicle Fire

After Initial Emergency Response Procedures have been applied, firefighting procedures may begin. Hyundai recommends that each response team follow their own department's standard operating procedures for fighting vehicle fires in combination with the NEXO specific details that are covered in this section.

### Firefighting Operations

If the high-voltage battery pack is either involved in or at risk of being involved in a fire in a NEXO, strict cautions must be taken while conducting firefighting operations due to following reasons:

- Lithium-ion polymer batteries contain gel electrolytes that can vent, ignite, and produce sparks when subjected to temperatures above 300°F.
- May burn rapidly with a flare-burning effect.
- Even after the high-voltage battery fire appears to have been extinguished, renewed or delayed fires can occur.
  - Use a thermal imaging camera to ensure the high voltage battery is completely cooled before leaving the incident.
  - Always advise second responders that there is a risk of the battery re-igniting.
  - If there is a fire, submersion or collision that has compromised the high voltage battery, always store it in an open area with no exposures within 50 feet.
- A burning battery could release hydrogen fluoride, carbon monoxide, and carbon dioxide gasses. Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.
- If the fire spreads to the hydrogen tanks at rear floor of NEXO, you should not extinguish the fire. Wait until the vehicle is done burning and find a place where you can protect yourself.

Even if the high-voltage battery pack is not directly involved in a vehicle fire, approach the vehicle very carefully.

### Extinguishers

- For small fires where the high voltage battery is not involved, extinguish using an ABC extinguisher for an electric fire.
- For fires where the high voltage battery is involved or the high voltage battery is heated, extinguish using large and sustained amount of water to cool the high voltage battery. Do not extinguish fires with a small amount of water. Firefighters should not hesitate to pour large amounts of water on the vehicle.

### Emergency venting of hydrogen gas

If the temperature near the safety valve located at the rear under vehicle is over 110°C, caused by a fire or other reasons, the safety valve will open to vent hydrogen gas. Venting the hydrogen gas makes a loud noise because the venting speed is very fast. Stay far away from the vehicle. This jet stream of hydrogen gas could ignite.

Hydrogen venting position

## High-Voltage Battery Damage and Fluid Leaks

The high voltage battery assembly is enclosed in a sturdy metal case that is rigidly mounted to the structural components of the vehicle. This construction helps prevent damage to the high voltage battery assembly, even in severe crashes. This section provides emergency responders with information on how to mitigate the severity of a damaged high voltage battery assembly or a rare gel electrolyte spill.

- Stop all smoke, spark and flame activity around the vehicle.
- The electrolyte solution is a skin irritant.
- Do not touch or step on the spilled electrolyte.
- If an electrolyte leak occurs, wear appropriate solvent resistant PPE and use oil, sand, or a dry cloth to clean up the spilled electrolyte. Be sure to adequately ventilate the area.

**WARNING** **Irritant Substance Risk!**

- The internal components of high voltage batteries are irritants and sensitizers.
- To avoid contact with these irritants and sensitizers, wear positive pressure self-contained breathing apparatus (SCBA) and other personal protective equipment (PPE) designed for use with these types of hazards.

Failure to wear proper SCBA and PPE can result in serious injury or death

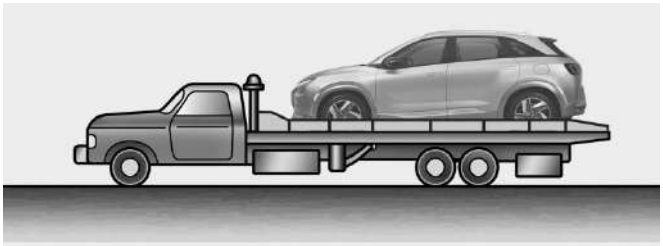
- The electrolyte solution is an eye irritant – If there is any contact with the eyes, rinse with plenty of water for 15 minutes.
- The electrolyte solution is also a skin irritant. If there is any contact with the skin, wash off with soap and water.
- Electrolyte liquid or fumes that have come into contact with water vapors in the air will create an oxidized substance. This substance may irritate the skin and eyes. In these cases, rinse with plenty of water and see a doctor immediately.
- Electrolyte fumes (when inhaled) can cause respiratory irritation and acute intoxication.

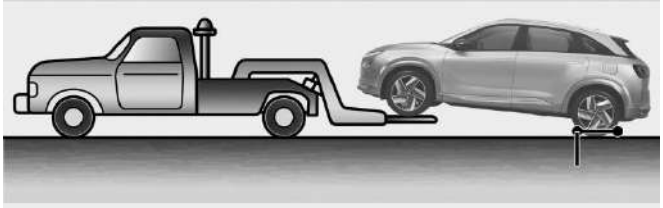
Move to a well ventilated location for fresh air and wash the mouth with water. See a doctor immediately.

## Towing

Towing the Nexo is the same as towing other vehicles with a gasoline engine. If emergency towing is necessary, we recommend having it done by an authorized HYUNDAI dealer or a commercial tow-truck service. Proper lifting and towing procedures are necessary to prevent damage to the vehicle. The best way to tow the vehicle is to lift the entire vehicle using a tow truck. However, to tow the vehicle using the two wheels, use a flatbed or wheel dollies and lift the front tires as the vehicle is equipped with a front wheel drive motor.

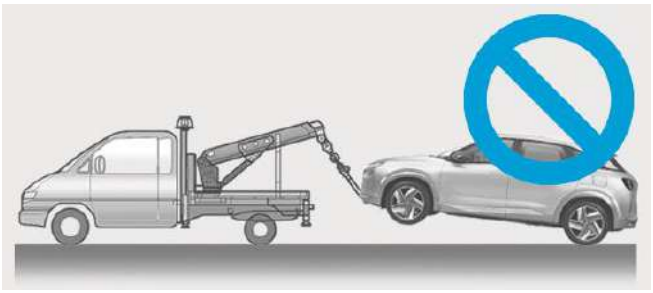
Before towing the vehicle, release the parking brake and turn the vehicle off. Then, press the 「P RELEASE」 button and place the shift lever in N (neutral). Detailed guidelines for towing the vehicle are as follows:





**CAUTION**

- Do not tow with sling-type equipment. Use a wheel lift or flatbed equipment.
- Never tow the vehicle with the front wheels on the ground (forward or backward), as this may cause damage to the vehicle.
- If the vehicle is equipped with the side air bag, make sure to turn the vehicle off. If the vehicle inclines while the vehicle is turned on, the system may detect it as a roll over and may deploy the side air bags.



## Jump Starting

1. Make sure the booster battery is 12-volts.

2. If the booster battery is in another vehicle, do not allow the vehicles to touch.

3. Turn off all unnecessary electrical loads.

4. First, disconnect the fuse box located on the left side of the fuel cell power module. Then, connect one jumper cable to the positive (+) battery terminal of the discharged battery (1) and connect the other end to the positive (+) battery terminal for the jump start (2).
Next, connect the second jumper cable to the negative (−) battery terminal for the jump start (3) and connect the other end to an unpainted robust fixed metal (i.e., hood latch striker), away from the battery.

**CAUTION**

- Do not connect the cables to or near any part that moves when the vehicle is started.
- Do not allow the jumper cables to contact anything except the correct battery terminals or the correct ground points.
- Do not lean over the battery when making connections.

5. After connect ng to the battery of an assisting vehicle, start the engine of the assisting vehicle and let it run for a few minutes.

6. Press the 「12V BATT RESET」 button.

7. Turn on the discharged vehicle after 15 seconds. Remove the jumper cable after turning on the vehicle.

8. Disconnect the negative (−) cable terminal first, and then the positive (+) cable terminal.

9. With the 「」 (READY) indicator turned on, stop or drive the vehicle for about 30 minutes.

10. If the cause of your battery discharging is not apparent, we recommend that the system be checked by an authorized HYUNDAI dealer.

RIGHT **HERE**, RIGHT **CARE**

HYUNDAI

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