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NAVYA AUTONOM SHUTTLE OWNER MANUAL



navya
be fluid

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I. INTRODUCTION

1-INSTRUCTIONS

These instructions for use combine, for your convenience, information allowing you to:



- Know the vehicle, benefit from better conditions of use, and all the technical enhancements with which it is provided;
- Keep in optimum operating condition by following the maintenance advice.

They comprise fundamental information for your safety and give you the most useful advice and assistance.

Before using the vehicle for the first time, you must therefore carefully read through these instructions for use and familiarize yourself with them.

All the specifications, stipulations and instructions contained herein apply only to the Autonom Shuttle.

In these instructions, safety instructions, warning and important information are represented by the following symbols:

 WARNING	Refers to any loss that the user may suffer or any significant material damage which the vehicle may incur if the user does not follow the given instructions attentively.
 INFORMATION	Information requiring additional attention.

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2-WHO ARE WE?



Mission: In the dawn of a new era of transportation of people and goods, NAVYA has given itself the mission of participating in the sustainable transformation of lifestyles by reinventing mobility in the first and last kilometer.

NAVYA is a French company specializing in developing innovative, smart and sustainable solutions. NAVYA develops driverless, automated electric vehicles that are independent of all infrastructures. These vehicles are a smart mode of transport and are therefore for the benefit of all citizens and society. The vehicle is equipped with a multitude of sensors and an embedded system that enables it to interact with its surroundings. It is also intended to provide efficient mobility solutions in terms of space and energy and has been built on sustainable inter-modality and multi-modality.

NAVYA has a significant lead in the technologies of autonomous electric vehicles with more than 10 years of experience and a highly qualified R & D team.

II. NAVYA : IN A GLANCE

1-QUICK LOOK

1.1-DRIVING BY NAVYA

The Autonom Shuttle is a 100% electric and autonomous public transport vehicle. This driverless, intelligent and innovative vehicle can carry up to 15 people and travel up to 25 km/h in complete safety, particularly on private sites.

The Autonom Shuttle provides innovative transport solutions to optimize journeys of staff, visitors and service providers on private sites. Depending on the legal framework, it may also be used in traffic on public roads – for vehicles and pedestrians – particularly to make transportation more fluid on the first and last kilometres.

Autonomous and flexible, the Autonom Shuttle does not need either a driver or specific infrastructure.

Intelligent and reliable, it adapts to situations by detecting static and dynamic obstacles.

The operation of the Autonom Shuttle is based on three principles:

- Perception, which allows the vehicle to know where it is in space and detect potential obstacles in the surroundings.
- Decision, which estimates the dynamic behavior to be adopted from the perception, to perform its task well.
- Action, which translates instructions from the decision using actuators to move the vehicle.

1.2-DIRECTION OF TRAVEL

The vehicle looks symmetrical and allows travelling in both directions. The convention on direction used is the following:

Note: *The doors are always on the sidewalk side no matter if we drive on the right or if we drive on the left*

Drive on the right

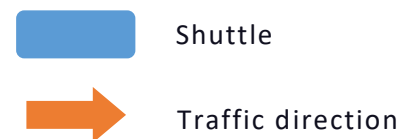
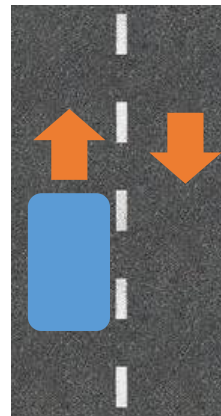
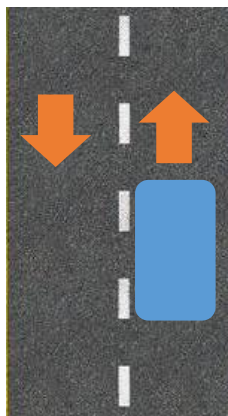
Forward Driving: The doors open on the right in the traffic direction.

Reverse Driving: The doors open on the left in the traffic direction.

Drive on the left

Forward Driving: The doors open on the left in the traffic direction.

Reverse Driving: The doors open on the right in the traffic direction



There are two shuttle variants :

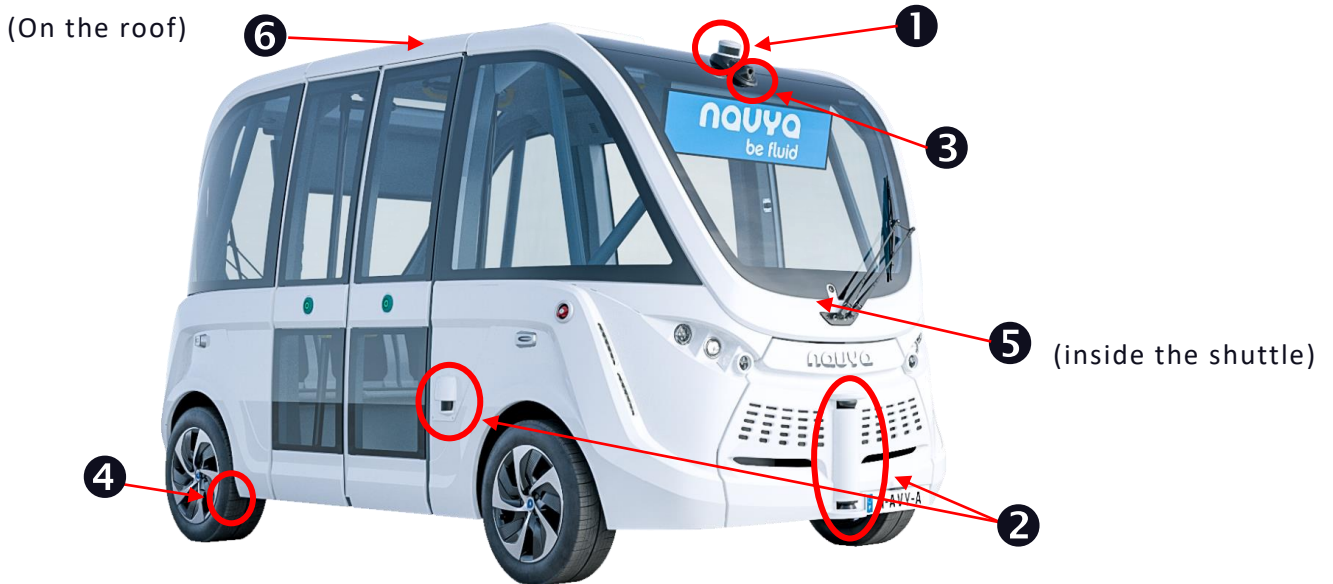
- Monodirectional : You can drive in one direction like a normal car.
- Bidirectional : You can drive in both directions, for example in a narrow street where the driver can't turn around. The main changes on the shuttle is regarding the lights (see "[Lighting - Exterior](#)").



2-100 % DRIVERLESS: A NAVYA TECHNOLOGY

2.1-SENSOR ARCHITECTURE

The following picture shows the sensor architecture and location:



- 1** : LIDARS 3D
- 2** : LIDAR 2D
- 3** : CAMERA
- 4** : ODOMETRY
- 5** : INERTIAL MEASUREMENT UNIT (IMU)
- 6** : TELECOMMUNICATION
 - GNSS antenna
 - 3G/4G antenna
 - Radio antenna

1 & 2	<p>2D & 3D Lidars sensors:</p> <ul style="list-style-type: none"> - Perceive the environment in 3D to map the location - Guarantee a precise position - Enable detection of all kinds of obstacles around the vehicle
3	<p>Cameras:</p> <ul style="list-style-type: none"> - Record the visual environment in the event of an accident - Road marking (optional)
4	<p>Odometry:</p> <ul style="list-style-type: none"> - Measures the speed of the wheels to estimate the movement of the vehicle - Adds redundancy to positioning of the shuttle

5	<p>Inertial Measurement Unit (IMU):</p> <ul style="list-style-type: none"> - Measures the acceleration of the vehicle to refine its position
6	<p>Telecommunication antennas (GNSS, LTE/MIMO, and Radio)</p> <ul style="list-style-type: none"> - Receive a GNSS position signal of a centimetre precision thanks to the differential corrections transmitted by the reference base station

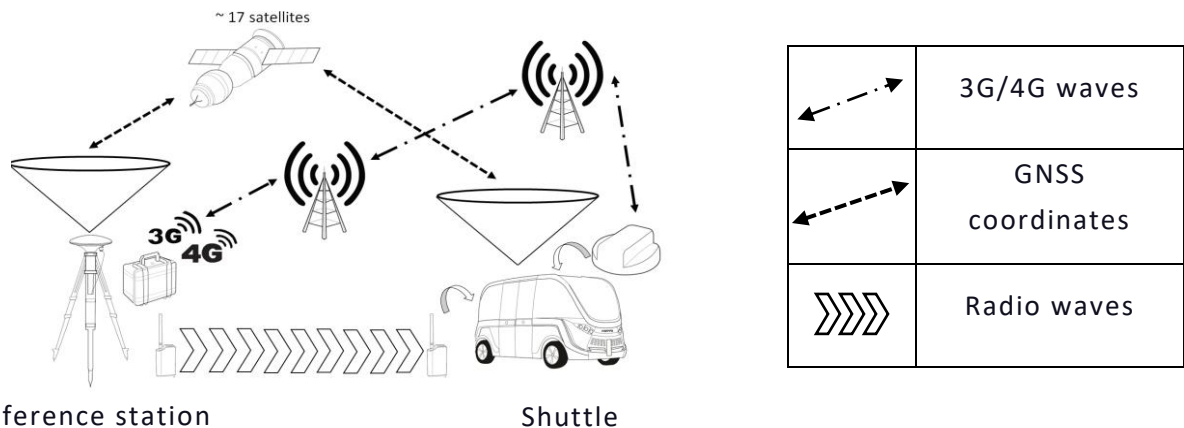
2.2-GNSS RTK

To ensure GNSS localization, systems use GNSS RTK correction. To do so, must be used either:

- A Navya GNSS base station
- A submission to a NTRIP service

Please note that a NAVYA GNSS base station uses both mobile network and radio to provide GNSS RTK correction, ensuring redundancy.

The following picture explains the pattern of communication between the vehicle and the reference station.

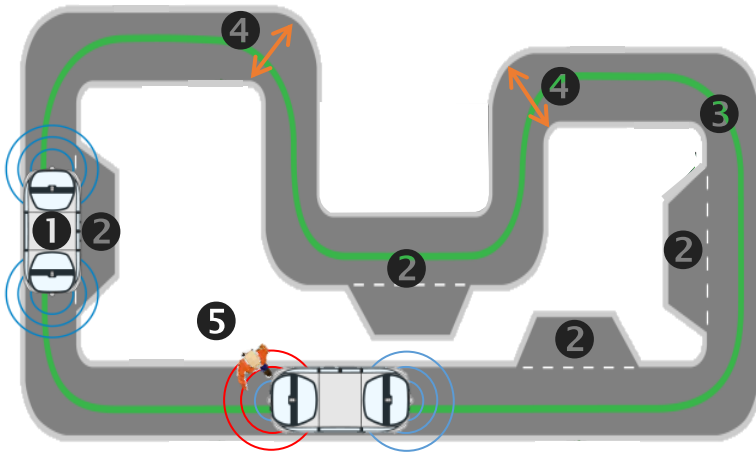


2.3-REFERENCE PATH

The reference path is a bounded area including all the roads on which the shuttle is allowed to drive. The shuttle monitors impediment inside this bounded area so it can stop or avoid them.

Speed, shuttle stops, right of way and traffic light are also defined in the reference path.


The Shuttle uses all this information of the reference path to drive safely to it destination.



①	Shuttle
②	Shuttle stop
③	Path required by customer (colored in green)
④	Shuttle comfort zone in which the shuttle can choose its own ride. It can stop and avoid impediment
⑤	Impediment (for example a pedestrian)

3-BATTERY SYSTEMS

3.1-IMPORTANT RECOMMANDATIONS

 CAUTION	<p>Please read these instructions carefully. If these instructions are not followed, it may cause a risk of fire, serious injuries or electric shocks which may cause death.</p>
---	--

In case of accident or impact on the chassis of the vehicle, (example: contact with a bollard, a raised pavement or other street furniture), the electrical circuit or the traction battery may be damaged. Have your vehicle inspected by Maintenance staff.

In case of fire, leave and evacuate the vehicle immediately, contact the emergency services specifying that it is an electric vehicle. If you must act, only use ABC type fire extinguisher. Do not use water or other extinguishing agents.

Never wash:

- The traction battery or car underbody with high pressure cleaner. There is a risk of damaging the electrical circuit;
- The vehicle when it is powered or charging;
- The vehicle with automatic washing rollers.

The High-Voltage system is safe even in case of water presence (e.g.: rainwater infiltrations through the doors). Nevertheless, the water in the passenger compartment should never exceed 5mm (1/4 inch). If it ever happens, have your vehicle inspected by Maintenance staff.

3.2-100% ELECTRIC VEHICLE

3.2.1- Batteries purposes

The vehicle has two batteries:

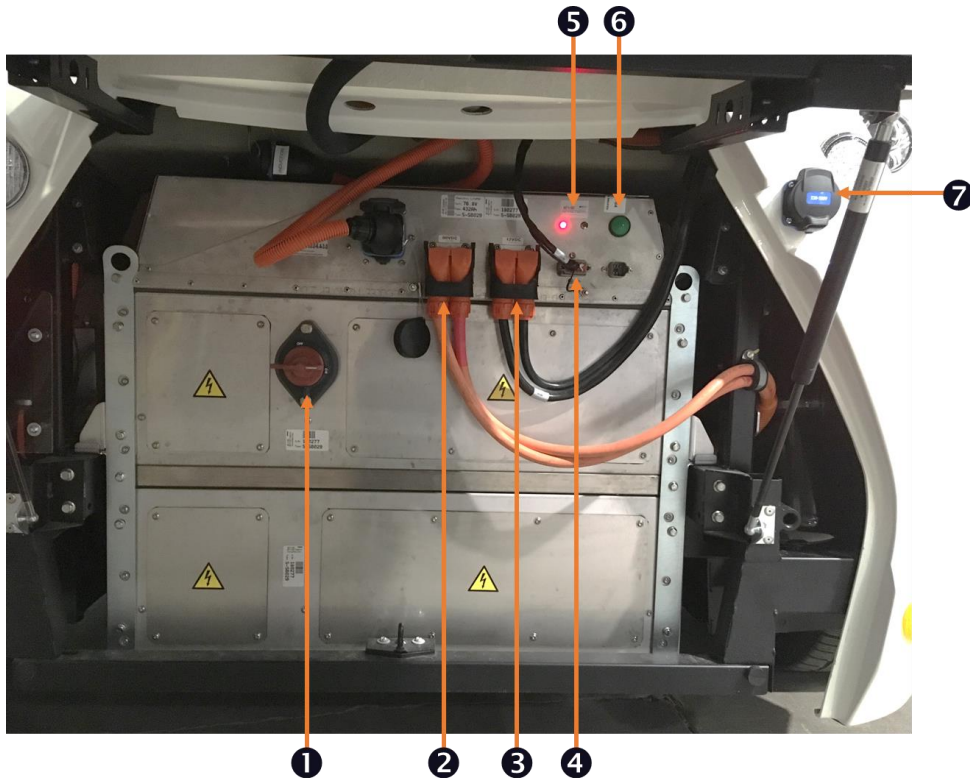
	80 volts traction battery	12 volts secondary battery
Chemistry	Lithium iron Phosphate (LiFePO4)	Gel
Voltage	76,8 volts	12 volts
Charging current*	16A & 32A	-
Capacity	33kW.h	56 Ah
	432 Ah	
Functions	Traction Maintaining the charge of the secondary battery	12 volts on board network
*: depending on the customer's coding electric socket		

3.2.2- 80 Volts battery

The 80 volts traction battery stores the energy needed to operate the electrical motor, the air conditioning and to maintain the 12 volts battery. It is situated under the high-voltage hood.

The rate of discharge of the traction battery depends on:

- The use of the vehicle
- The operating cycle
- The vehicle's speed
- The number of passengers
- The slope of road / path
- The external temperature
- The consumption of the on-board network
- The use of air conditioning and heating
- Etc.



- | | |
|--------------------------------|--------------------------------|
| ❶ : 80 Volts disconnecter | ❺ : SOC (State of Charge) LEDs |
| ❷ : 80 Volts circuit connector | ❻ : Battery reset |
| ❸ : 12 Volts circuit connector | ❼ : Charging plug |

The battery SOC (State of Charge) can be seen with the LEDs (❺), and on the internal screen (dashboard).

On the battery, while in use, **RED** is ON and **GREEN** indicates the level of charge:


- 1 pulse = 0 to 25%
- 2 pulses = 25 to 50%
- 3 pulses = 50 to 75%
- 4 pulses = 75 to 95%
- 5 pulses = more than 95%
- 6 pulses = fully charged


3.2.3- 12 Volts Battery

The 12 volts secondary battery provides the energy needed to operate auxiliary equipment of the vehicle (screens, doors, lights, steering rack, brake pump, etc.) The secondary battery is continually charged by the 80 volts traction battery. It is situated in the Secondary Battery Trunk of the vehicle (in the passenger compartment).

3.3-BATTERY CHARGING

3.3.1- Important recommendations

 CAUTION	<p>Do not undertake work on the vehicle when charging (cleaning, working on the electrical installation, working in the engine compartment etc.)</p>
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 INFORMATION	<p>Charging Suitable temperatures:</p> <ul style="list-style-type: none"> • Vehicle storage: [-20°C/-4°F ; +60°C/140°F] • Charging vehicle: [0°C/32°F ; +40°C/104°F]
---	--

- The vehicle will **NOT** charge if it is parked in a place where the temperature doesn't fit with the charging suitable temperature.
- It is needed to **plug the traction battery right away after driving if the vehicle is stored in a cold area.**
- Avoid charging and parking your vehicle in extreme temperature conditions (hot or cold).
- If the vehicle remains stationary for several hours at temperatures less than about 0°C / 32°F, it will not be possible to charge the traction battery.
- If the vehicle remains stationary for several days with a charge level close to zero percent, it will not be possible to charge the traction battery.

The standard charging cable supplied with the vehicle has been designed specifically for this vehicle. If you want to replace it, please consult NAVYA.

	16A Cable	32A Cable
Socket Type	16A mono (2P+T)	32A mono (2P+T)
Max Power	3680 W	7360 W

This standard charging cable must meet the following conditions:

- If there is water, signs of corrosion or any foreign element in the connector of the charging cable or in the charging socket of the vehicle, do not charge the vehicle. → **Risk of fire!**
- Do not touch the contacts of the cable, the domestic socket or the charging socket of the vehicle, nor introduce any objects into it.

- Never connect the charging cable to an adapter, to a cable reel or to a multi extension lead.
- Do not remove or change the charging socket of the vehicle or the charging cable → **Risk of fire!**
- Regularly check the proper condition of the charging cable. If there is any damage or wear to the charging cable (corrosion, browning, breaks, etc.) do not use it. Replace it.
- Have a professional check that each socket to which you are going to connect the charging cable is in good working condition and conforms to the standards and regulations in force for the country.

3.3.2- Charging Procedure

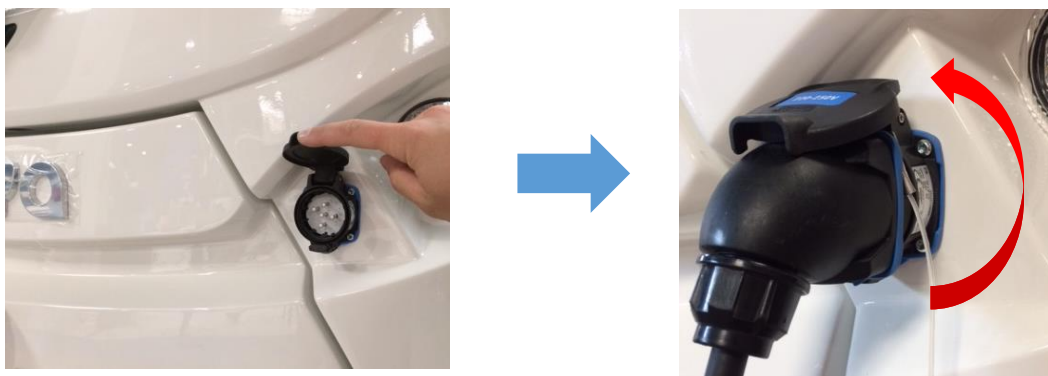
Pre-requisites: The installation must have a power cut-off device on the electrical panel (switch or other)

To charge the vehicle, you need to:

1. Select the charging cable fitting to your electrical installation:
 - a. If your wall electric plug is dimensioned for 16 amps, select the 16A charging cable;
 - b. If your wall electric plug is dimensioned for at least 32 amps, you can either choose the 16A or the 32A charging cable. Please note that the 32A charging cable will reduce the charging time.

NEVER use the 32A charging cable on a 16amps wall electric plug → Risk of Fire

2. Check that the charging cable is in good condition and free of every connection.
3. Check that the switch is opened (position off) on the electrical panel.
4. Plug the shuttle side of the charging cable to the Shuttle electric outlet;
⇒ Lock the connection by realizing a rotation of a 1/8 turn anti-clock wise.



5. Unroll the charging cable so that it doesn't make a "loop";
6. Connect the other side of the charging cable to the wall electric plug.
7. Switch on the electrical panel (turn on the switch) to start the charging.

To stop charging, you need to:

1. Switch off the electrical panel thanks to the power cut-off device.
2. Disconnect the charging cable from the wall plug.
3. Disconnect the charging cable from the shuttle plug.

III. QUICK START


1-SAFETY INSTRUCTIONS

1.1-AUTHORIZATION, APPROVAL AND QUALIFICATION

Any person (keeper, operator, technician) working on the vehicle must hold a valid driving licence and be registered beforehand and trained by NAVYA.

Any driver must have the necessary physical and mental qualities and must be physically and mentally in a state to drive.

Any driver must have the knowledge and the skills required to drive a vehicle.

 CAUTION	Ensure that you are aware of all the safety instructions before putting the vehicle into operation.
---	--

In Manual Mode, the operator is considered as the driver of the vehicle. The operators who use the shuttle must have the capacity to drive the vehicle (authorization, driving licence, NAVYA training...). They are responsible for the vehicle movement (any material damage, injuries caused...).

The operator must always adjust the speed of the vehicle to the conditions and keep a safe distance from other vehicles.


2-ENVIRONMENT REQUIREMENTS

2.1-METEOROLOGICAL CONDITIONS

To guarantee the integrity of the several sensors, the operation of the vehicle must be interrupted if the outside ambient temperature is less than -10°C / 14°F or greater than +40°C / 104°F for a DL4 vehicle and -10°C / 14°F or greater than +45°C / 113°F for a DL5 vehicle.

For safety reasons, the operation of the vehicle must always be interrupted in case of severe weather (heavy rain, fog, ice, snow, frost, strong winds, etc.).

In case of severe weather, it is also recommended to park the vehicle under shelter or in a garage to avoid any damage to the equipment, windows or body elements.


 WARNING	<p>Beyond 60°C / 140°F, the LIDARs start their critical temperature phase and degrade irreversibly, eventually causing damage on the component.</p>
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2.2-SAFETY INSTRUCTIONS

The traffic lanes authorized for the operation of the vehicle will be defined in advance with NAVYA. All the authorized lanes must be suited to motor vehicle traffic (tarred or paved surface) so as not to wear out the vehicle prematurely. These lanes must be regularly checked and maintained.

If the carriageway is worn (roadworks, ice removal etc.) or in case of a dangerous impediment on the carriageway (roadworks equipment, raised manhole cover etc.), the operation of the vehicle will have to be interrupted until the carriageway is effectively restored.

In case of alteration of the road system or horizontal (ground markings) and vertical (lights, signs) signaling on the site, the on-board mapping of the vehicle must be updated before resuming operation of the vehicle.

 CAUTION	<p>If the recommendations on meteorological conditions are not met, NAVYA cannot be held responsible for any material damage or injury caused.</p>
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3-OPERATING INSTRUCTIONS

3.1-POWERING ON/OFF

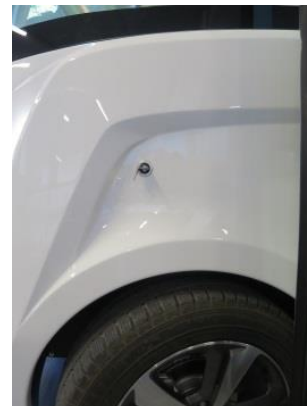
3.1.1- Powering ON

1. Turn the key "ON" (clockwise);
2. Doors become operational after few seconds;
3. Displays, calculator & computer boot up automatically;
4. Vehicle dashboard becomes available after 2 minutes;
5. The shuttle can now be used.



3.1.2- Powering OFF

1. On the dashboard, access the operator mode
2. On the top left of the operator mode, click on the button to turn off the computers
3. Wait 1 minute
4. Close the doors before powering off
5. Turn the key "OFF" (anti-clockwise)



Powering off takes about 2 minutes. To make sure it is done, check that doors cannot be operated

3.2-DRIVING

Two operating modes are available:

- **Manual Mode**



The operator drives the shuttle using a joystick.

Manual mode is used for manoeuvring.

An Assisted Manual Driving (AMD) function is available (or could be deactivated).

This feature helps the operator to avoid damages in manual mode. The AMD introduces a “warning zone” and a “danger zone” in the vehicle’s direction of travel (forward and backward). The response of the vehicle will depend on which zone the obstruction is within:

- Warning zone: Buzzer activates and speed decreases
- Danger zone: Horn activates and vehicle is stopped

 CAUTION	<p>In Manual Mode, if AMD is deactivated, the obstacle detection function is fully disabled.</p> <p>In any case, it’s the operator responsibility.</p>
 INFORMATION	<p>The electric engine is very quiet.</p> <p>Be careful while driving, some people can’t hear the shuttle</p>

- **Automatic Mode**

The vehicle operates autonomously.

The operator monitors the operation of the vehicle and may, at any time, activate the emergency stop if a situation, considered dangerous, happens.

3.2.1- Driving in Manual Mode

3.2.1.1- Control Equipment Location

Procedure

1. Open the panel of the Computer Trunk (see ["Passenger Compartment Trunk"](#))


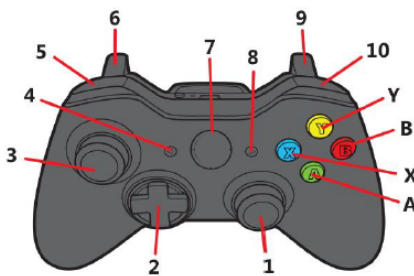
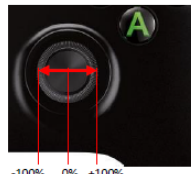


2. Take the control equipment (controller joystick);



3. Do the operations;
4. Put back the control equipment in its location;
5. Close the panel of the Computer Trunk (see ["Passenger Compartment Trunk"](#))
6. Ensure that the joystick cable does not damage internal components (e.g.: Switch).

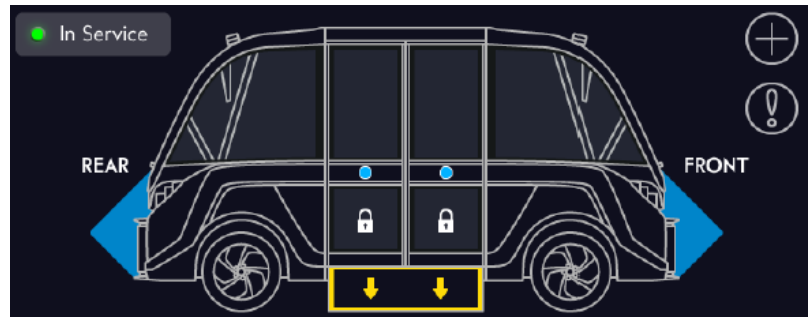
3.2.1.2- Control Equipment Description

		MANUAL MODE CONTROL												
<p>Automatic / Manual : Automatic mode is active by default. Switch to manual mode by pressing (6). Return to automatic by pressing (6) and (10).</p> <p>Standby / Use : Press the control (B) to switch between the Use mode and the Standby mode and vice versa. Standby mode disables propulsion.</p> <p>Driving / Parking : Three speed thresholds are available in the parking mode : 0.1, 0.3 and 0.5 [m/s]. Press the arrows (up or down) to change the threshold.</p> <p>Deadman : To be able to operate the shuttle, the control (6) must be constantly pressed. Release the control (6) causes emergency braking.</p> <p>Braking : To trigger the hard braking, release the control (6) or press the emergency button in the shuttle.</p>														
<p>Acceleration / Deceleration : Propulsion joystick (3)</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p style="background-color: red; color: white; padding: 2px;">Max acceleration</p> <p style="background-color: green; color: white; padding: 2px;">Progressive acceleration</p> <p style="background-color: blue; color: white; padding: 2px;">Constant speed</p> <p style="background-color: purple; color: white; padding: 2px;">Progressive braking</p> <p style="background-color: grey; color: white; padding: 2px;">Max braking</p> </div>  </div>								<p>Direction : To steer the vehicle, gradually orient the joystick (1) to the left or right to turn left or right in the forward direction.</p> 						
1	2 (up/down)	2 (left/right)	3	4	5	6	7	8	9	10	Y	B	X	A
Direction	Driving/Parking	Fog/dipped-beam lamp	Propulsion	Left turn signal	Doors	Deadman	∅	Right turn signal	∅	Automatic	∅	Standby / Use	Buzzer	Horn
WARNING Only persons authorized by NAVYA are allowed to operate the shuttle			In case of problem, please use the safety procedures and contact NAVYA's Supervision center											

In bidirectional, the Y button can be activated depending on the chosen scenario:

- Manual bidirectional:

This mode corresponds to bidirectional driving with manual Front/Rear switch. It is possible to switch Front/Rear with “Y” button of the joystick. This switch is only possible in manual mode when vehicle is



stopped. In autonomous mode, the vehicle can only drive forward. If the vehicle is not placed in the right position, a manual Front/Rear switch allow to unblock the situation.

- Auto bidirectional:

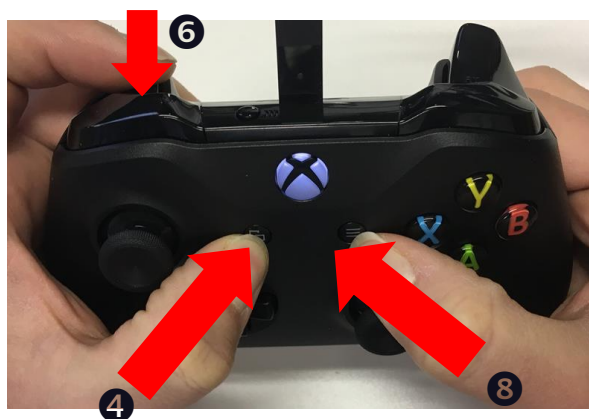
This mode corresponds to bidirectional driving with autonomous Front/Rear switch. In this configuration, in autonomous mode, the vehicle can move in the two directions because Front/Rear switch is done automatically (vehicle does not move backward but Front/Rear switch is done automatically to move always forward). Light positions are also change automatically. The Front/Rear switch cannot be done manually with “Y” button.

Be careful: the manual driving is impacted by the last direction driven in autonomous mode

Note: This feature is only possible with a bidirectional shuttle and not for a monodirectional.

3.2.1.3- Hazard warning lights

- To activate the hazard warning lights, press the deadman button ⑥ and then the buttons ④ and ⑧;
- To turn off the warning lights, press the deadman button ⑥ and then press the buttons ④ and ⑧ again.



3.2.2- Operating in Automatic Mode

Only people who are registered and have been trained by NAVYA can use the Automatic Mode.


4-EMERGENCY STOP

4.1-USE OF EMERGENCY STOP BUTTONS

The emergency stop buttons are permanently active, both in Manual Mode and in Automatic Mode.

Faced with a situation that is judged to be dangerous, the emergency stop of the shuttle may be activated by any person on board by triggering one of the two emergency stop push buttons. They are situated inside the passenger compartment.

Triggering of one of the emergency stop buttons triggers a powerful emergency braking that immobilizes the vehicle in a few meters and turn on the warning lights automatically.

 WARNING	<p>During an emergency stop, the level of deceleration of the vehicle is high.</p> <p>To prevent any fall on the board the vehicle, ensure that the passengers hold on tight throughout the journey.</p>
---	--



Emergency stop buttons location



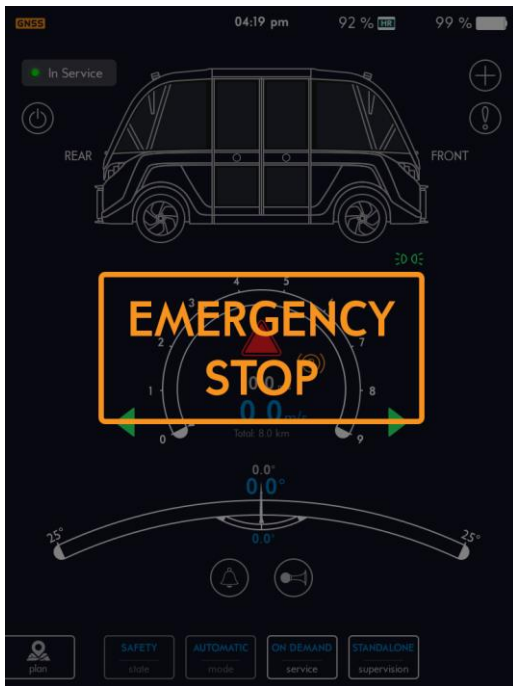
One on each side

4.2-EMERGENCY STOP DISENGAGEMENT SAFETY PROCEDURE

At the actuation of the emergency stop, the shuttle is switched in safety mode.

After immobilization of the vehicle following the triggering of one or more emergency stop buttons, it is necessary to rearm the emergency stop buttons and wait a few seconds.

In Automatic Mode, it is possible that the intervention of an operator is necessary to restart the system.



4.2.1- Emergency stop actuation due to a hazardous road event

Before disengagement of the emergency stop button:

- 1.1) The road event shall be identified
- 1.2) The situation shall be safe

4.2.2- Emergency stop actuation due to a hazardous shuttle behavior

Before disengagement of the emergency stop button:

- 2.1) The shuttle shall be inspected in order to detect the reason for actuation:
 - Visual inspection of mechanics part
 - Reporting to the Supervision

- Inspection of event log by the Supervision

2.1.1) The reason of the actuation shall be identified

*In case of **reason not detected**, refer to procedures applicable:*

- Immobilization of the shuttle
- Waiting for supervision instructions

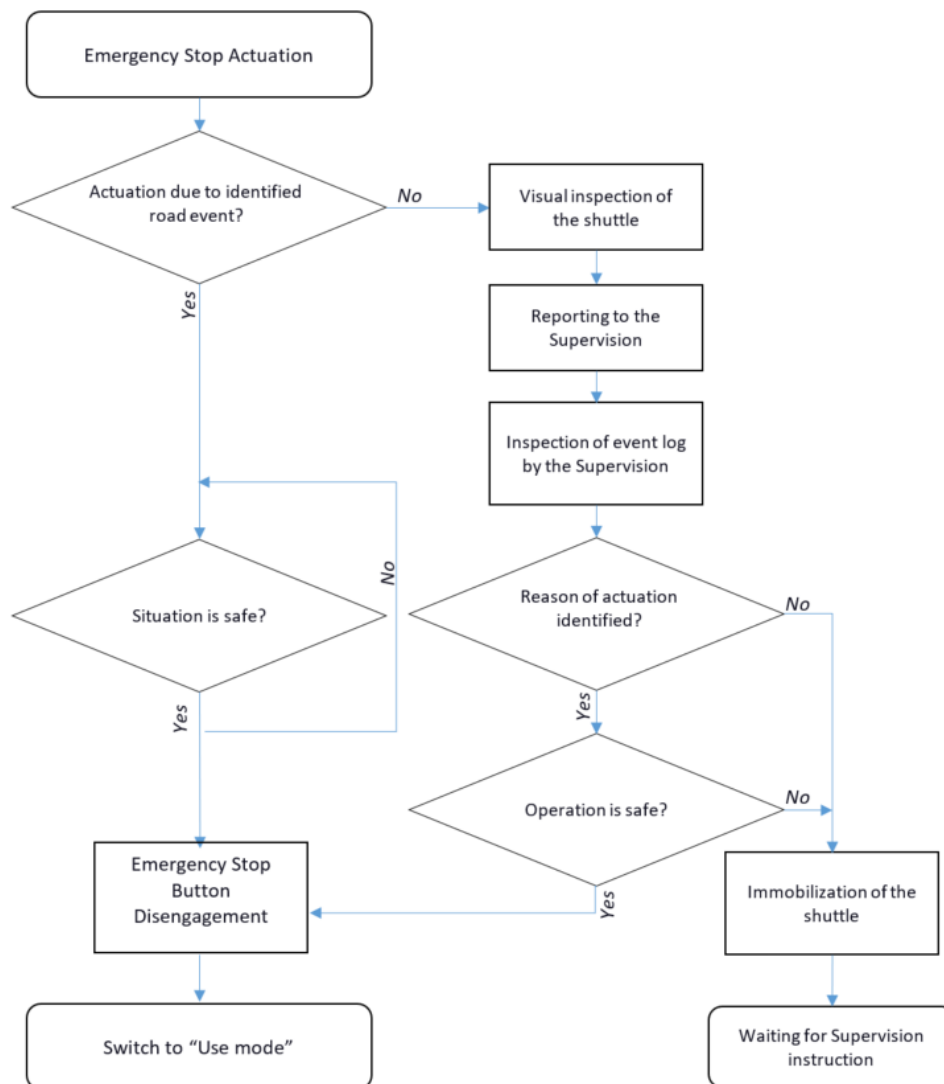
2.1.2) The reason of the actuation shall not impact the safety of the operation

*In case of **impact on the operation**, refer to procedures applicable:*

- Immobilization of the shuttle
- Waiting for supervision instructions

At the disengagement of the emergency stop, the shuttle mode is in “Stand-by” mode and required to switch to “use mode”

4.2.3- Emergency stop disengagement workflow

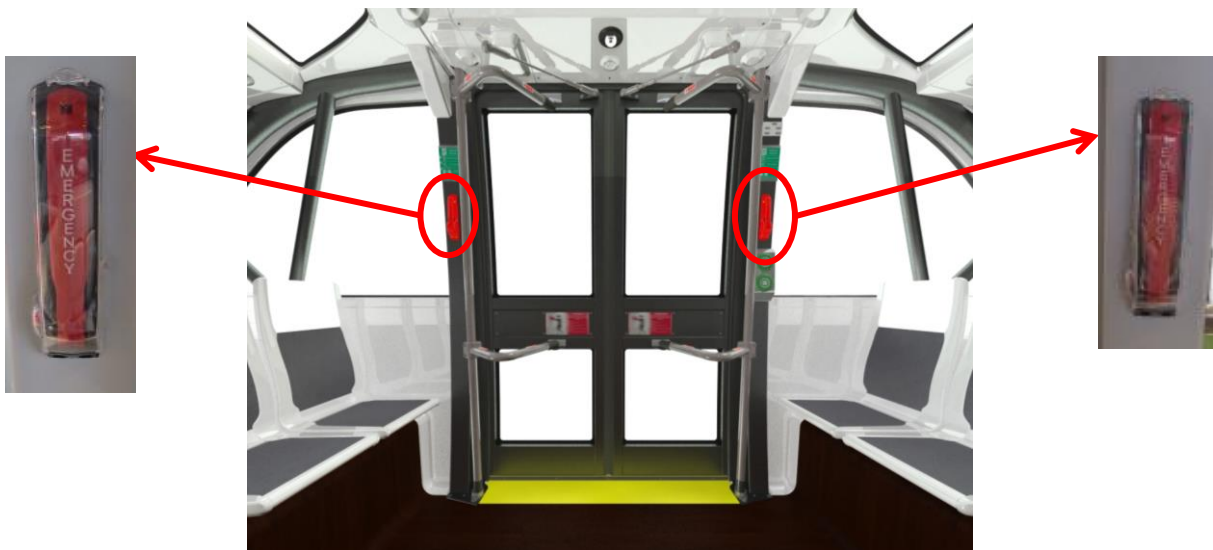


4.3-USE OF EMERGENCY EVACUATION DEVICES

4.3.1- Use the door release system inside the shuttle

 WARNING	Depending on failures, doors may not work correctly.
---	---

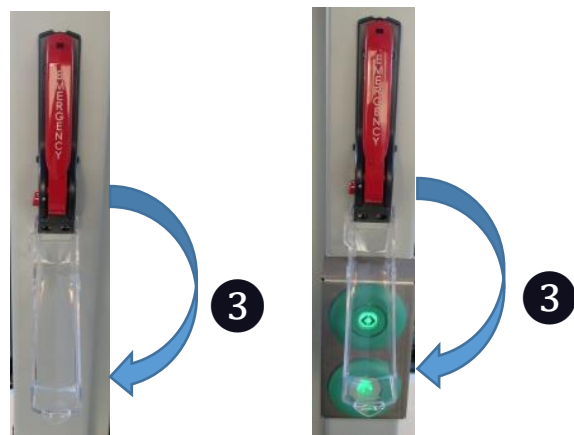
If necessary, the doors will open via the interior door-opening button or open the doors manually (see « [Inside the shuttle](#) » & « [Door System](#) »):



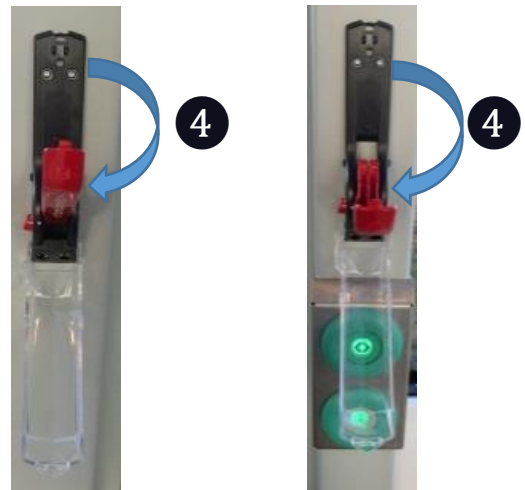
Location of the emergency evacuation devices

Note: Each door release system opens only one door leaf.

1. Open the protection cover (**3**);



2. Gently pull the lever (4) to disengage the doors (90 degrees);



3. Push the lower doorjamb of the door to open it.



To close the doors after using the door release system:

1. Press the button (5) and raise the lever to its initial position;



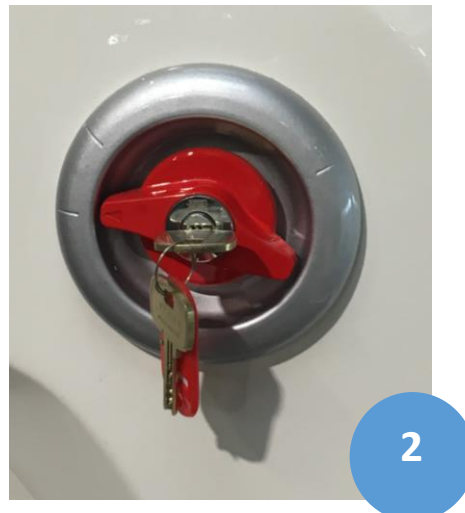
2. Put the protection cover back;
3. Engage manually the engine of the door (pay attention to the seal). A noise will validate the engagement of the door;



4. Press the door opening button to let the doors open correctly.

4.3.2- Use the door release system outside the shuttle

1. Insert the key into the lock (1) and turn the key (2)



2. Turn it clockwise until be in position (3)

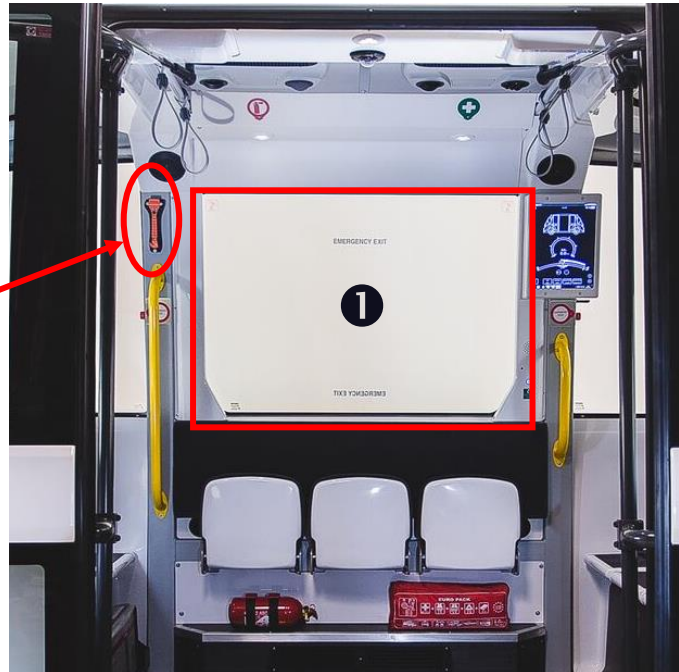


3. Pull on the door to open it (pay attention to the seal).





4.3.3- Use the emergency hammer

If it is impossible to leave the vehicle by the door side, use the glass breaker hammer located on the body pillar on the opposite side from the doors to break the side window marked "EMERGENCY EXIT" (1).



	Take care to protect your face with your forearm when breaking the "EMERGENCY EXIT" side window.
WARNING	Help people in difficulty to get out of the vehicle.

5-OVERHEATING ENGINE SAFETY PROCEDURE

Temperature	Pictogram	Meaning
$T < 100^{\circ}\text{C}$ (212°F)	NA	Temperature is normal
100°C (212°F) $< T < 120^{\circ}\text{C}$ (248°F)		Minor engine overheating
$T \geq 120^{\circ}\text{C}$ (248°F)		Major engine overheating

5.1-MINOR ENGINE OVERHEATING

Overheating of the engine without loss of performance of the vehicle.

- The operator shall stop the vehicle smoothly in a safe area and shall ask the passenger to leave the vehicle;
- The operator shall secure the environment and turn off the vehicle;
- The operator shall contact the adequate service to report the incident;
- The operator shall not go back to operation without the OK of the adequate service.

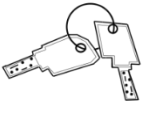
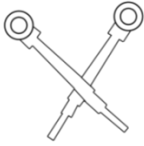

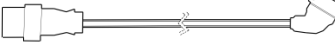
5.2-MAJOR ENGINE OVERHEATING

Overheating of the engine with progressively loss of performance of the vehicle.

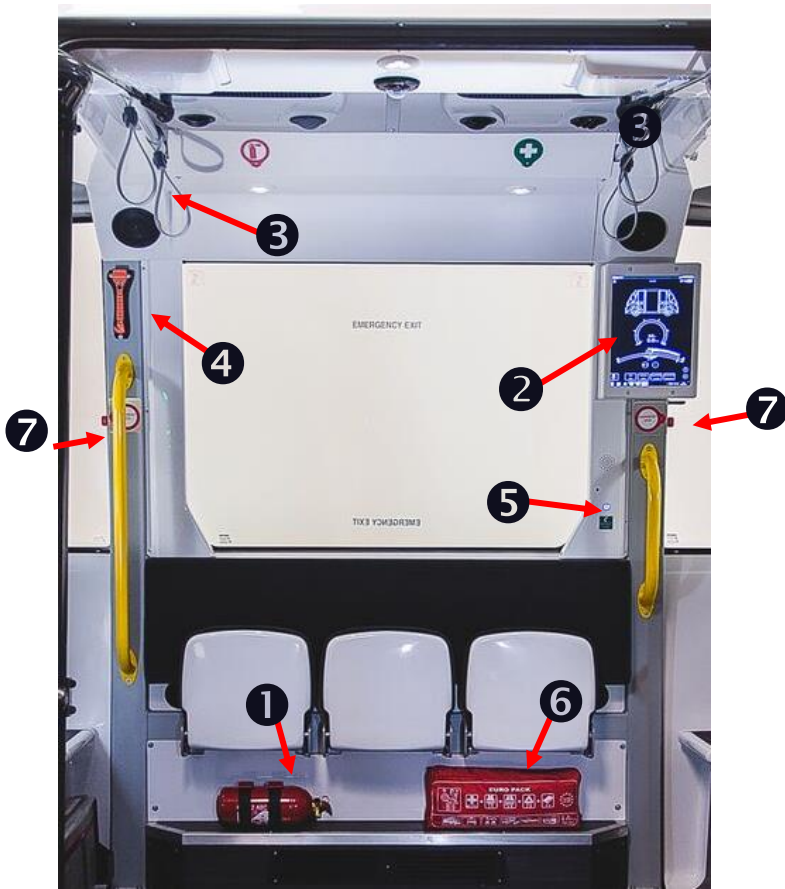
- The operator shall stop the vehicle immediately and shall make sure the passenger leaves the vehicle safely;
- The operator shall secure the environment and turn off the vehicle;
- The operator shall contact the adequate service to report the incident;
- The operator shall not go back to operation without the OK of the adequate service.

IV. OVERVIEW

1-SHUTTLE KIT

Each shuttle is composed of:	
- Powering on/off keys (quantity: 2)	
- Towing rings (quantity: 2)	
- Keys for unlocking doors (quantity: 2)	
- Charging cable (16 or 32A) * (length: 5m) (quantity: 1)	 Generation 1
<i>Charging cable connectors could be changed according country's requirements.</i>	

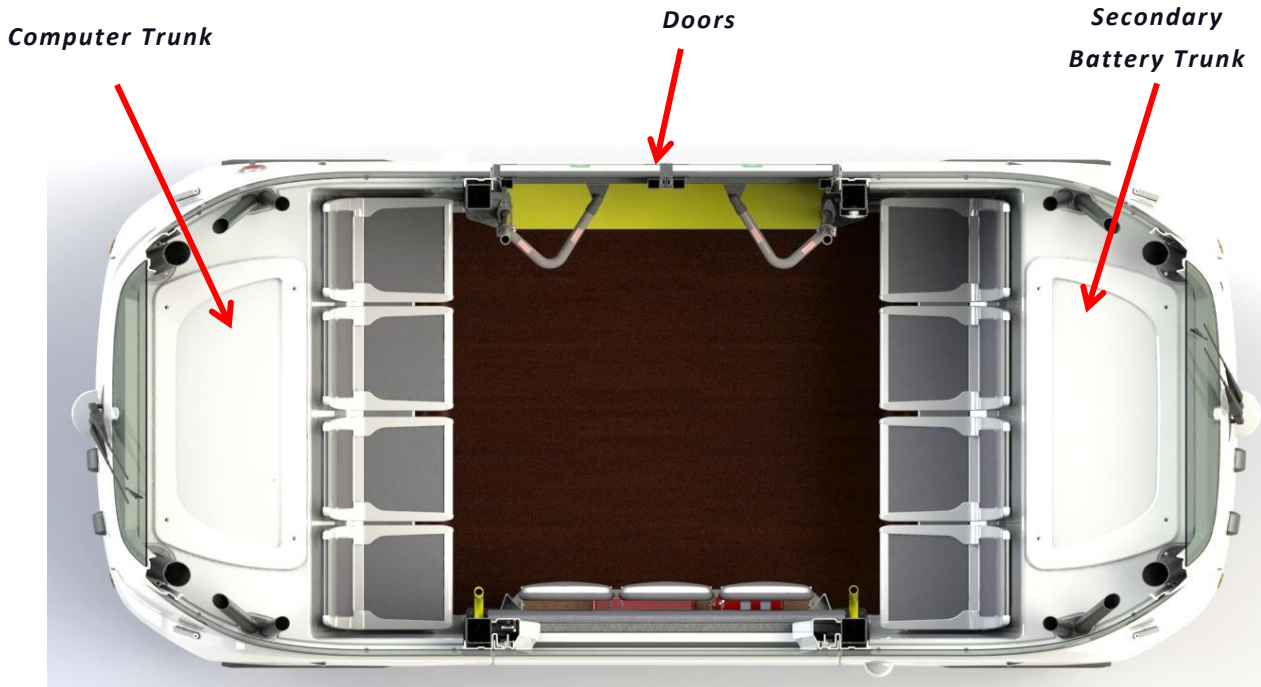
2-INSIDE THE SHUTTLE



①	<i>Fire extinguisher</i>
②	<i>Navigation Touch Screen</i>
③	<i>Handles</i>
④	<i>Emergency Hammer</i>
⑤	<i>Speakers / Intercom</i>
⑥	<i>First emergency kit</i>
⑦	<i>Emergency stop button</i>

3-PASSENGER COMPARTMENT TRUNK

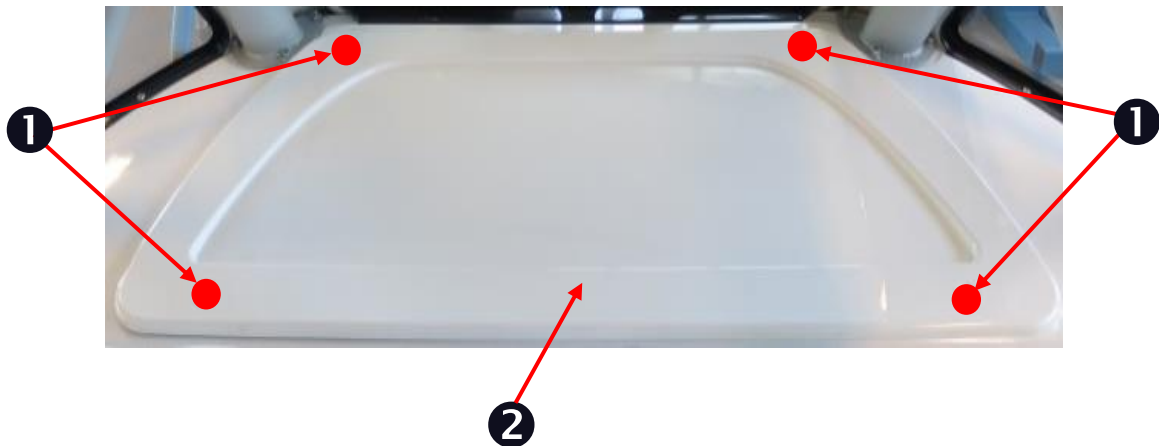
3.1- LOCATION



3.2-COMPUTER TRUNK

Follow the steps below to open the Computer Trunk:

1. Unscrew the 4 screws (1);



2. Lift the panel (2);

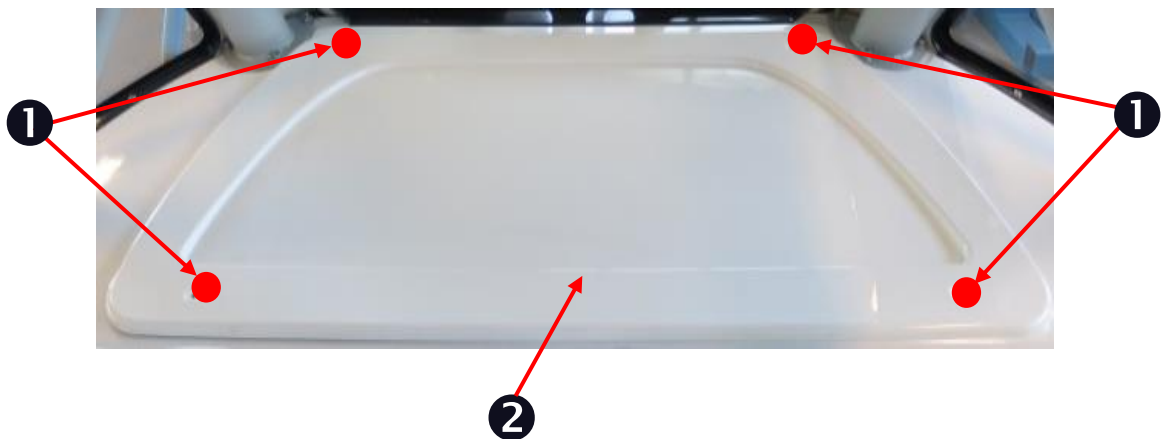


3. Do the interventions;
4. Put back the panel (2);
5. Screw the 4 screws (1).

3.3-SECONDARY BATTERY TRUNK

Follow the steps below to open the Secondary Battery Trunk:

1. Unscrew the 4 screws (1);



2. Lift the panel (❷);



3. Do the interventions;
4. Put back the panel (❷);
5. Screw the 4 screws (❶).

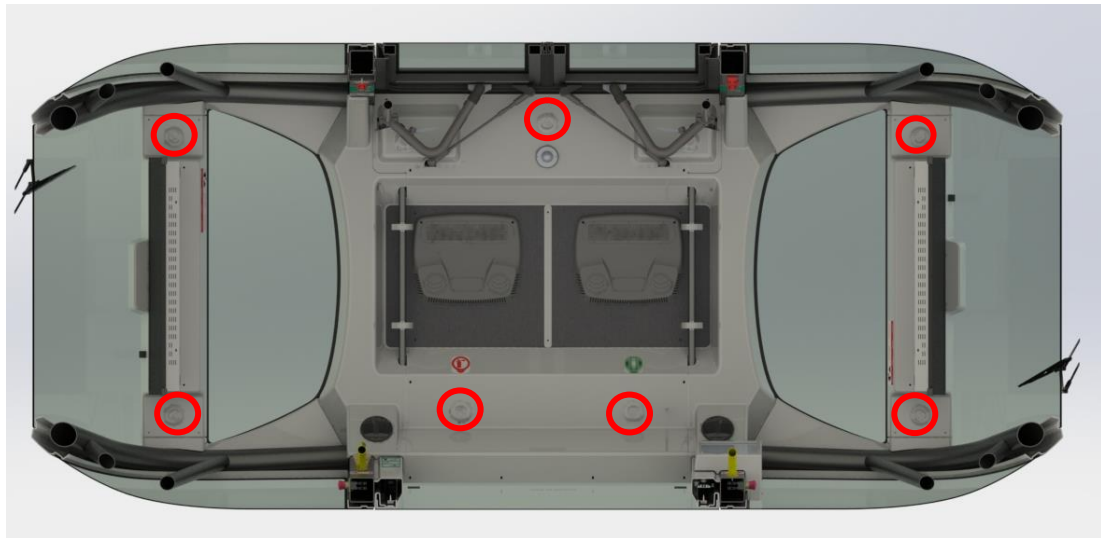
4-LIGHTING

4.1-INTERIOR

The internal lighting equipment is composed of 7 LED spots situated in the ceiling. The LED spots at the front and at the rear of the shuttle are switch off when the shuttle is in Use mode to ensure a good visibility.



LED spots location

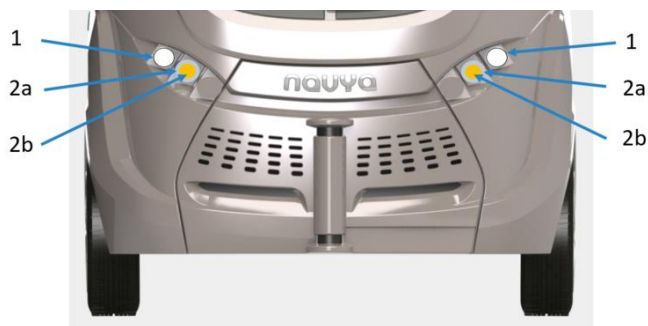


Ceiling view

4.2-EXTERIOR

4.2.1- Mono-directional

Front side



1	Low beam light
2a	Position light / DRL
2b	Turn signal light

Rear side

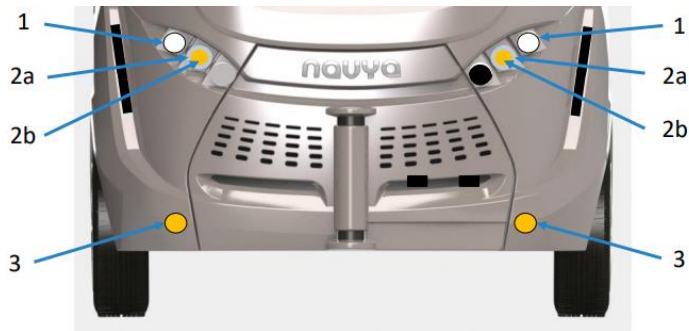


4	Turn signal light
5	Position light / Stop light
6a	Rear fog light
6b	Reverse light
7	Retro-reflectors
8	License plate light
9	Plug for power supply

4.2.2- Bi-directional

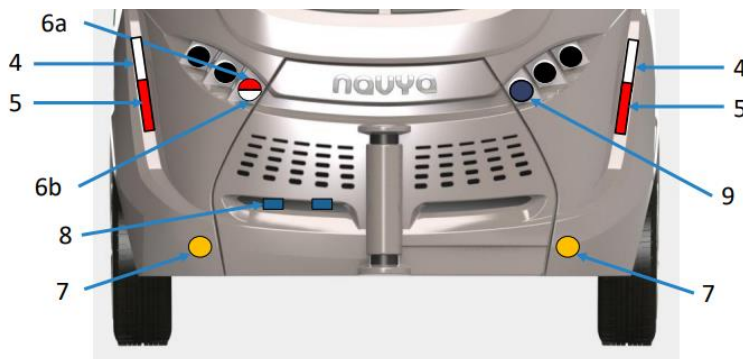
Note : The front and rear lights are automatically chosen depending on shuttle direction.

Front side



1	Low beam light
2a	Position light / DRL
2b	Turn signal light
3	Retro-reflectors
	Existing but used in the other shuttle direction

Rear side



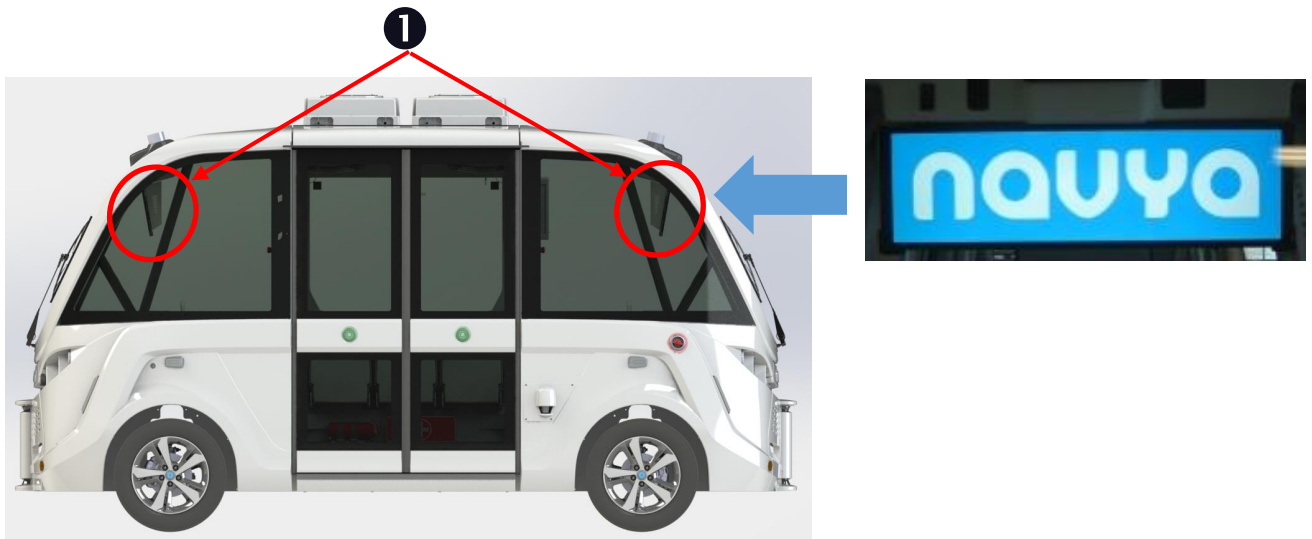
4	Turn signal light
5	Position light / Stop light
6a	Rear fog light
6b	Reverse light
7	Retro-reflectors
8	License plate light
9	Plug for power supply
	Existing but used in the other shuttle direction

5-SIGNALING

5.1-EXTERNAL INFORMATION DISPLAY

The information displays are situated in a high position at the front and rear of the passenger compartment and facing to the outside.

In operation, the vehicle communicates with road users through the external information display.



❶ : External Information Display

5.2-AUDIBLE SOUND

Electrical vehicles are particularly silent. This system allows those around to be warned in case of danger.

To do this, in Automatic Mode, the vehicle is fitted with a horn and a buzzer which are automatically operated.

Buzzer is activated when the shuttle decelerates due to a presence of an obstacle. Once the shuttle is stopped on obstacle, horn is activated every 10s.

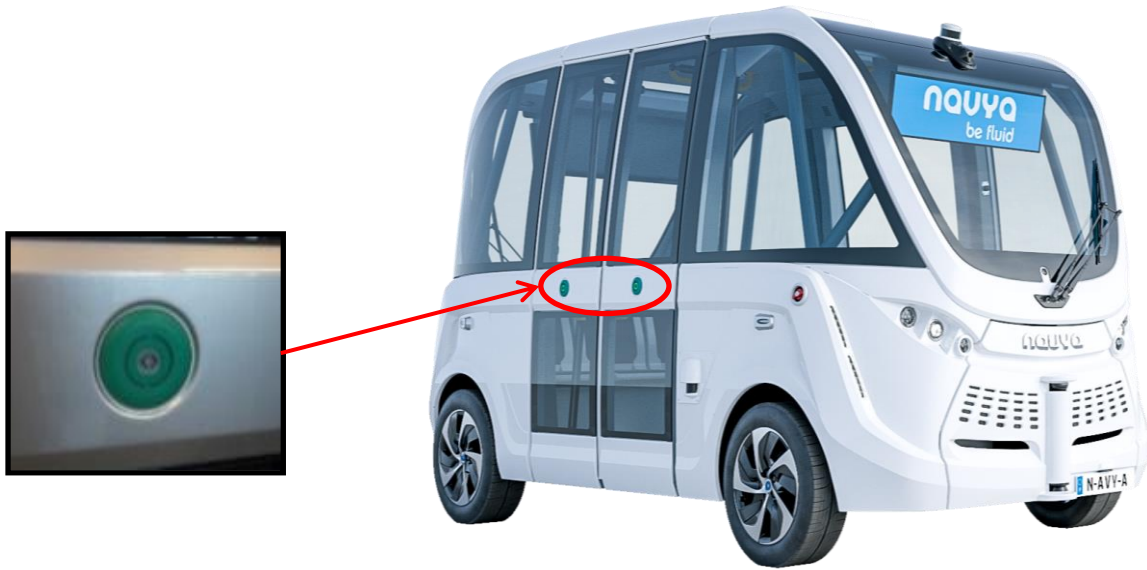
Buzzer is activated when the shuttle decelerates on station arrival and when doors are closing.

The buzzer and the horn are also activated in AMD mode when there are obstacles.

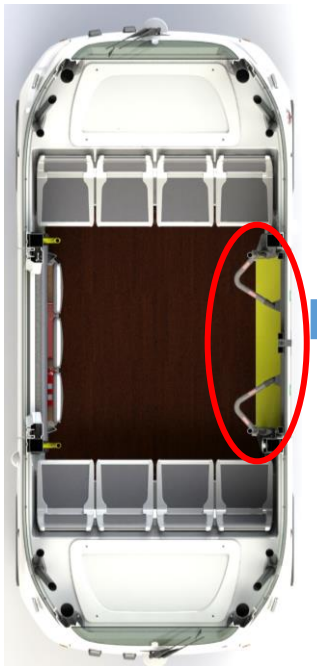
They are located at the front of the vehicle.

We can also activate them thanks to the controller and on the Navigation Touch Screen.

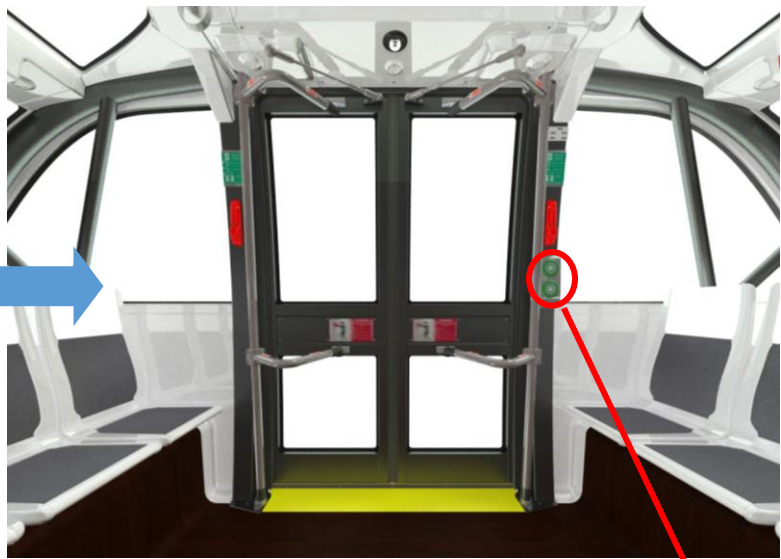
6-DOOR OPENING BUTTON



Exterior view

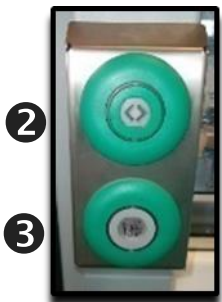


Interior view



② : Inside door-opening button.

③ : Not used yet



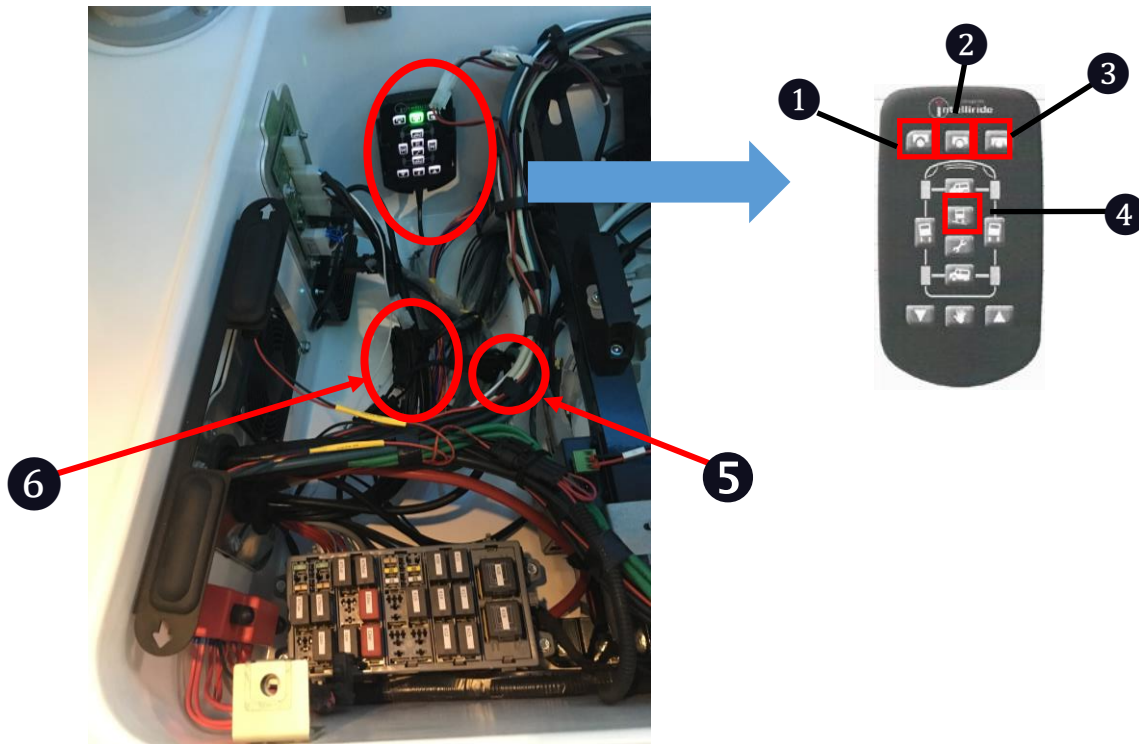
Inside door opening buttons are only activated when the shuttle is stopped.



7-PNEUMATIC SUSPENSION

The vehicle is equipped with an oleo-pneumatic suspension system which allows you to adjust the height of the vehicle.

The suspension remote control provided with the vehicle allows three preconfigured vehicle heights to be selected.

The suspension remote control is installed in the Computer Trunk (see ["Passenger Compartment Trunk"](#))



<p>Low Position(1):</p> <p>→Accessibility for person with reduced mobility</p>	<p>Intermediate position (2):</p> <p>→Driving in manual or automatic mode</p>
<p>High Position (3):</p> <p>→Maneuvering</p>	<p>Maintenance Button (4)</p>
<p>The pneumatic suspension can be blocked at one of the three positions set using the switch (5).</p>	<p>5 </p>
<p>The switch button (6) allows switching between the three parameterized positions without using the controller.</p>	<p>6 </p>

7.1-NORMAL OPERATION

In normal operation, the remote-control button corresponding to the selected position (❶), (❷) or (❸) is backlit in continuous green.

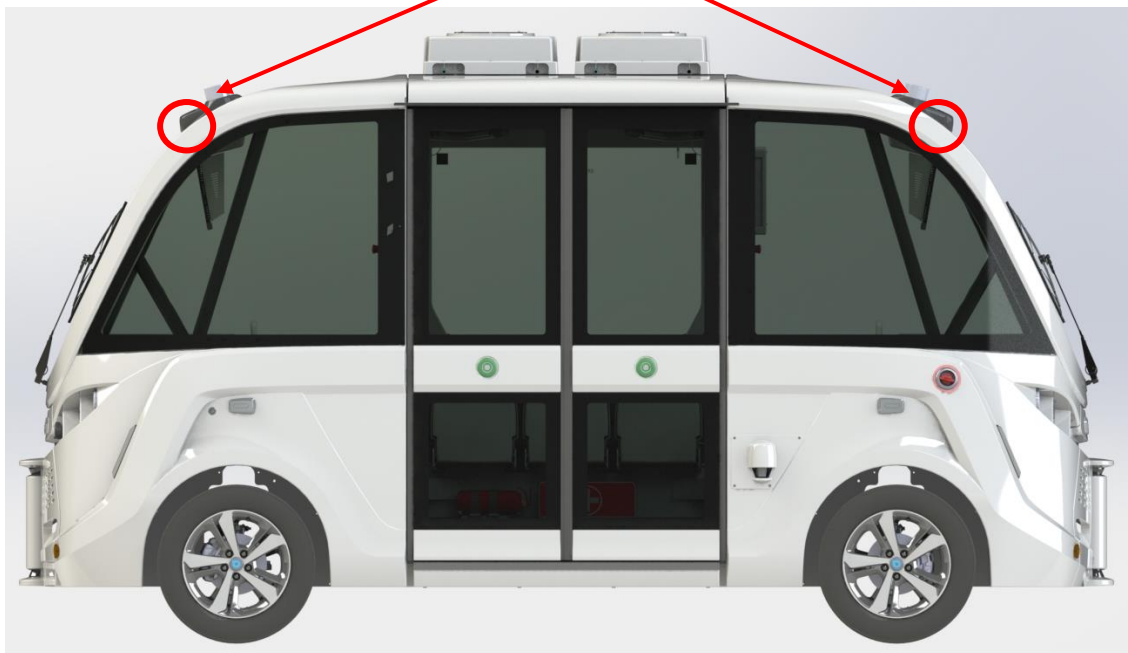
7.2-DEGRADED OPERATION

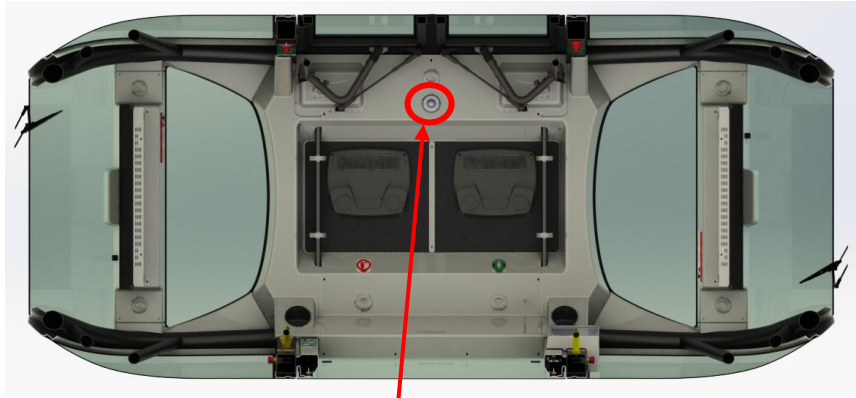
In case of malfunction (for example, if the suspension system does not reach the required height), the system goes into fault mode: the maintenance button (❹) is backlit in flashing red and the three position buttons are backlit in flashing green. To correct the malfunction, press button (❹) for at least five seconds and then press one of the position buttons (❶), (❷) or (❸).

8-CAMERA

The vehicle is equipped with 3 Cameras:

Front and Rear facing cameras





Inside fish-eye camera

9-SPEAKER / INTERCOM

The vehicle is equipped with a Speaker & an Intercom in the passenger compartment next to the lateral window and the Navigation Screen Touch (see [« Inside the shuttle »](#)).

In case of emergency, passengers can interact with the Supervision Service thanks to the intercom. The ceiling camera allows the Supervision Service to watch the passenger compartment (see [« Inside the shuttle »](#)).



10-NAVIGATION TOUCH SCREEN

The vehicle is equipped with a Navigation Touch Screen in the passenger compartment next to the lateral window and the Speaker & the Intercom (see [« Inside the shuttle »](#))

This screen allows you to view the site map and the shuttle location.

For more information, please refer to the DUI User Guide given by Navya.

11-AIR CONDITIONING

NAVYA shuttle is equipped with a reversible air conditioning which can heat or cool the passenger compartment / cabin depending on the exterior temperature thanks to two air cooling units of 4.6 Kw.

The remote control of air conditioning is installed in the Computer Trunk. It allows regulation of the cabin temperature and the fan speed.

The remote control is deactivated while the shuttle is in standby (Standby Mode).

Note: Depending on the model, the air conditioning and the controller could be use when the shuttle is in standby mode.

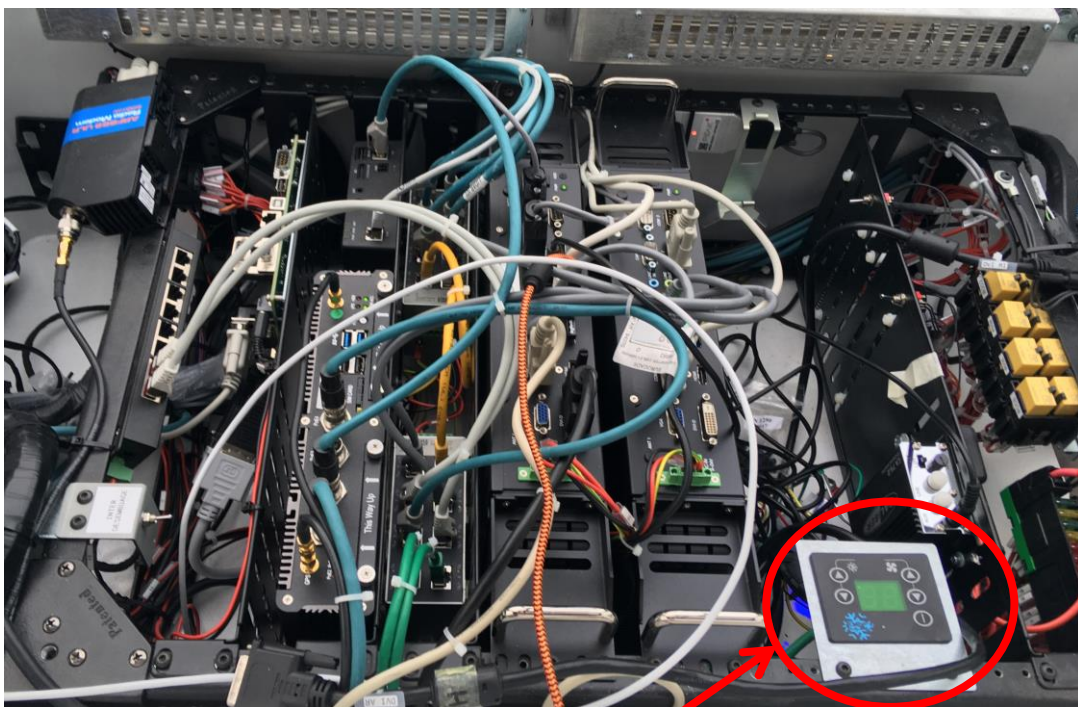


Air vent Location

Follow the steps below to change air conditioning temperature or speed (**1**):



1. Open the panel of the Computer Trunk (see "[Passenger Compartment Trunk](#)")



1

2. Use air conditioning remote control (❶) to regulate the temperature and/or speed with the I/O button.



3. Close the panel of the Computer Trunk (see ["Passenger Compartment Trunk"](#))

12-OPTIONAL WINDSCREEN VENTILATION

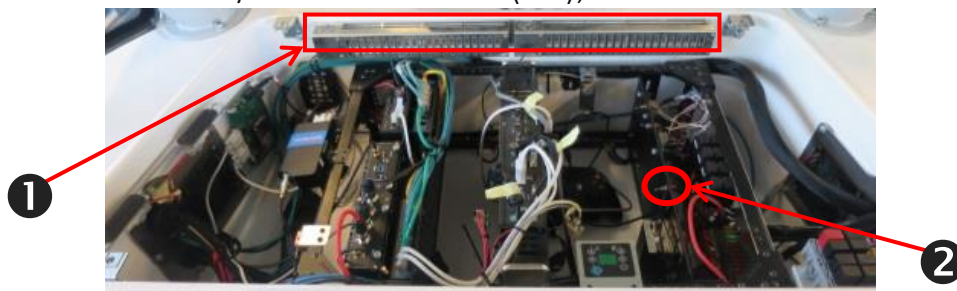
NAVYA Autonom shuttle could be equipped with the optional windscreen ventilation.

If equipped, to activate the windscreen ventilation, press the toggle switch (❷) in the Computer Trunk.

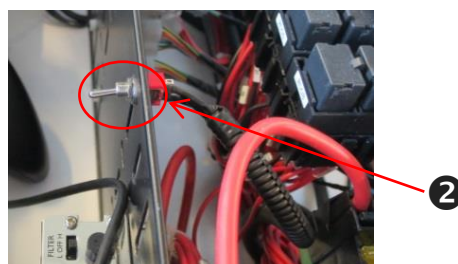
Follow the steps below to switch on/off the ventilation (❶)



1. Open the panel of the Computer Trunk (see ["Passenger Compartment Trunk"](#))
2. Switch on/off the ventilation (❷);



3. Close the panel of the Computer Trunk (see ["Passenger Compartment Trunk"](#))



13-WINDSCREEN WIPER

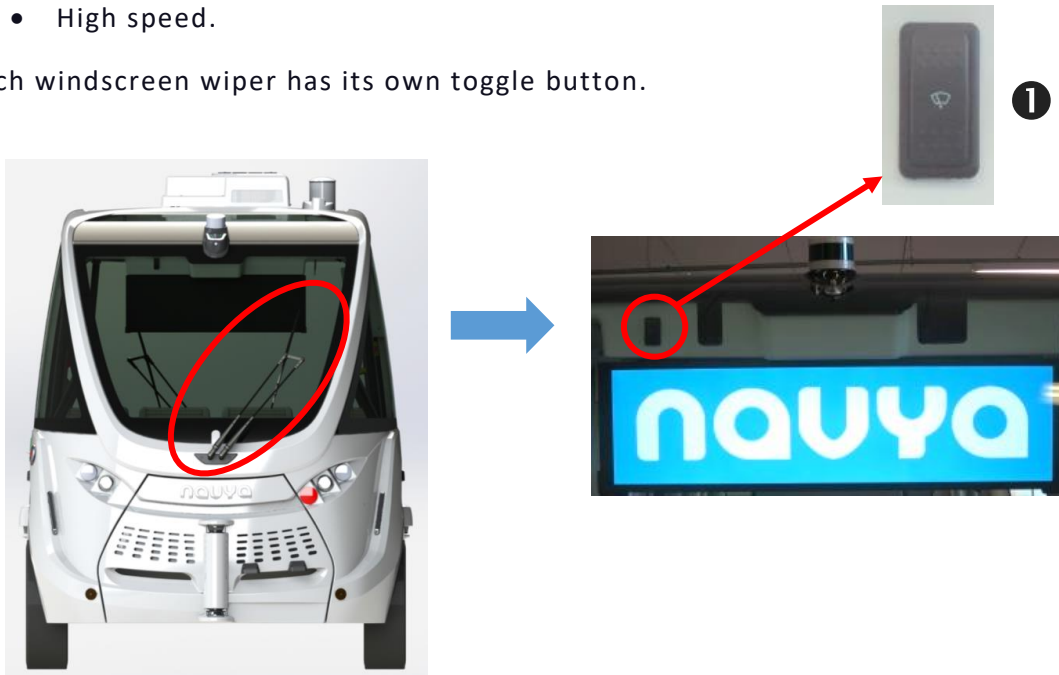
NAVYA shuttle could be equipped with an optional windscreen wiper on both windcreens with its own control.

To activate the windscreen wiper, press the toggle button.

There are 3 speed positions:

- Stop;
- Low speed;
- High speed.

Each windscreen wiper has its own toggle button.



Location of the windscreen wiper toggle button ①

	The toggle button is easy to reach from the passenger compartment.
INFORMATION	Each button is located closed to External Information Display.

14-FIRE EXTINGUISHER

NAVYA shuttle is equipped with an optional ABC type fire extinguisher.

The fire extinguisher is located under the folding seats.



V. MAINTENANCE

1-TIRE CARE

Tires must be checked each month. Indeed, tires lose pressure naturally.

Check daily the tire condition before the operation (crack, puncture, deformation etc ...)




	Front	Rear
Tires Type	215/60 R17C (109/107T)	
Cold Inflation Pressure	NAVYA recommendation	
	4,5 bars (58 psi)	4,5 bars (58 psi)

2-CLEANING

2.1-INTERIOR


2.1.1- Interior Glass

Clean with cloth and organic cleaner product without water.

 WARNING	<p>Do not use abrasive cleaner, glass can be affected.</p>
---	---


2.1.2- Plastic Surfaces

Clean with a microfiber cloth and plastic cleaner.

 WARNING	<p>Do not use solvents and alcohol cleaners, plastics can be affected.</p>
---	---


2.1.3- Seats

Use a microfiber cloth and organic cleaner product without water.

 WARNING	Do not use any type of detergent or chemical cleaning agents.
---	--

2.1.4- Touchscreen

Clean the touchscreen using a soft cloth specifically designed to clean displays.

 WARNING	Do not use chemical cleaning agents and dry statically-charged cloth, touchscreen can be damaged.
---	--

To remove finger marks, use an organic cleaner without water.


2.2-EXTERIOR

2.2.1- Body

A well-maintained vehicle lasts longer.

Clean the vehicle regularly to prevent any damage to the paint:

- Natural contaminants (bird droppings, dead insects...);
- Aggressive substances (fuel, oil, salt, tar...).

 CAUTION	Do not use a pressure washer to avoid any damage. Do not wash on following areas: <ul style="list-style-type: none">- Under the vehicle- Front & rear batteries area- Sensors Do not use the automatic car wash. Do not use hot water and detergent, chemical based cleaners and alcohol base cleaners.
---	---

To wash the exterior, use organic cleaner without water.

2.2.2- Sensors

Before each start, the site manager or operators must check the good condition of the sensors.

They may have to clean the sensors with:

- Microfiber cloth;
- Hot Water.

3-FIRE EXTINGUISHER

This equipment must be checked at least once a year by an expert. If local regulation is more restrictive, please follow the local regulation.

4-REPLACING COMPONENTS


To ensure the reliability and the operating of the shuttle, use only the spare components supplied by NAVYA.

4.1-SAFETY INSTRUCTIONS

Any person having to work on the vehicle must be registered in advance and trained by NAVYA, and duly qualified and authorized to undertake maintenance operations on an electric vehicle.

Maintenance operations that you are authorized to undertake are only those described in this section.

For any other maintenance operation, you must contact the site manager or NAVYA.

 <p>INFORMATION</p>	<p>Before undertaking any operation to carry out work on vehicle, ensure you have well understood all the safety instructions in this manual.</p>
---	--

4.2-WEARING PERSONAL PROTECTIVE EQUIPMENT

For all operations to carry out work on the vehicle, and more particularly maintenance and handling, take the protection measures that are laid down:

- Wear compulsory protection (goggles, gloves, shoes, hard hat or helmet);

- Keep unauthorized persons away (public, children etc.);
- Follow the instructions for using the vehicle.

This list is not exhaustive. Please respect all local regulation for safety.

4.3-REPLACING BATTERIES

4.3.1- Main battery (80 volts traction battery)

For any damage to the batteries or their components (cables...), stop electrically the vehicle and call immediately the supervision team. Avoid any people to approach the vehicle

4.3.2- Secondary battery (12 volts)

Follow the steps below to replace the 12 volts Battery (**1**):



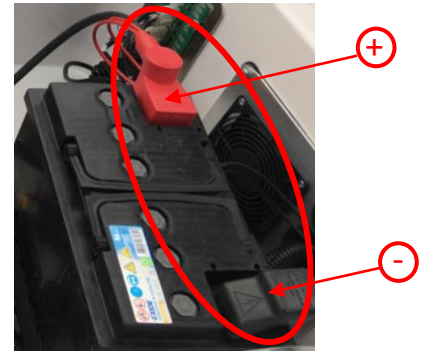
1. Open the panel of the Secondary Battery Trunk (see ["Secondary Battery Trunk"](#))




Identify battery terminals (terminals “-“ and “+”);


2. Disconnect the negative terminal “-“;
3. Disconnect the positive terminal “+“;
4. Replace the waste battery by a new battery;
5. Connect the positive terminal “+“;
6. Connect the negative terminal “-“;

Close the panel of Secondary Battery Trunk (see ["Secondary Battery Trunk"](#))



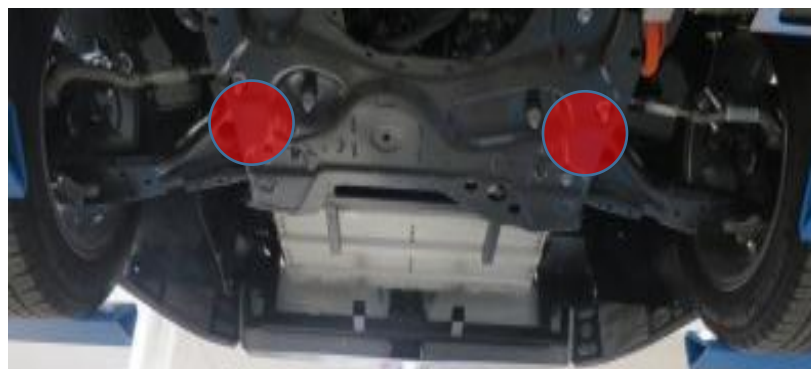
 WARNING	<p>Risk of electric shocks, fire and injuries</p> <p>To avoid damaging shuttle, do not recharge secondary battery with:</p> <ul style="list-style-type: none"> - Battery charger - The battery of a car
---	---

4.4-REPLACING TIRE AND WHEEL

 CAUTION	<p>No spare wheel in the shuttle</p> <p>Call “Supervision Service” or/and Site Manager</p>
--	--


Please follow the steps below:

1. Loosen the bolts (max ¼ turn) with the wheel removal nut wrench;
2. Position the base of the jack (that should be able to handle 2500 Kg) on the ground and ensure that this is opposite the place provided on the frame;
3. Position the engine sub frame or on the chassis rails (the areas of lifting are located in red on the below figure);




Bottom view

4. Raise the vehicle until sufficient space is left between the wheel and the ground;

 CAUTION	<p>Ensure that the jack is properly stable. If the ground is slippery or loose, there is a risk of the jack sliding or collapsing, with a risk of injury!</p>
---	--

5. Unscrew the bolts by hand until they are completely removed;
6. Remove the wheel from the spindle;
7. Put the new wheel onto the spindle. Bolt the bolts by hand until they stop;
8. Bring the vehicle back down to the ground. Re-fold the jack and disengage it;
9. Tighten the bolts with the wheel removal to a torque of 120Nm using a torque wrench.

 CAUTION	<p>Only use the wheel bolts provided for the type of wheel fitted and for your vehicle.</p>
	<p>After having changed a wheel, immediately check the tightening torque using a torque wrench. Wheels may become detached if the bolts are not tightened to a torque of 100 Nm.</p>

4.5-REPLACING RELAYS & FUSES


Please refer to the document Fuses and relays.

4.6-REPLACING LIGHTING

Exterior




LED Lights

 INFORMATION	<p>To replace the LED lights and / or adjust them, refer to the Maintenance manual.</p>
---	--

4.7-REPLACING WIPER BLADE

Front & Rear location

1. Lift the wiper arm;
2. Fold up the wipers & Position the wiper blade in a horizontal position;
3. Remove the wiper blade (❶) (Glide wiper blade down the arm);
4. Insert the new wiper blade in reverse order of removal until it locks in place. It must engage audibly;
5. Fold down the wiper against the windscreen.

 WARNING	Do not fold down the wiper without wiper blade, this may damage the windscreen.
	Don't climb on the shuttle to replace the wiper blade. Use a stepladder.
	Risk of falling.



4.8-TOWING

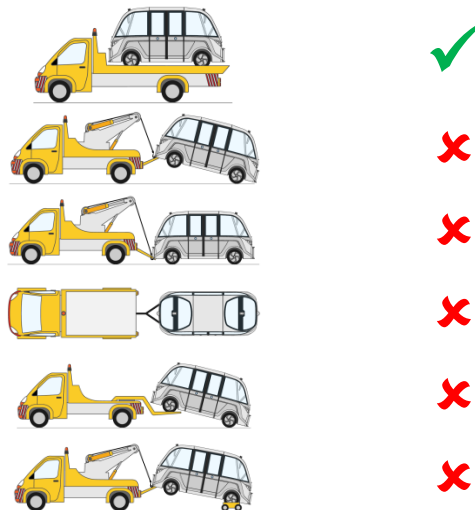
First, put all the occupants of the shuttle in a safe position.

Make the shuttle safe using the warning triangles that are in the emergency kit.


 INFORMATION	<p>Call the NAVYA “Supervision Service” or/and the representative on site.</p>
---	---

4.8.1- Choice of the towing vehicle

Towing of the shuttle is only allowed using a flatbed truck.



4.8.2- Procedure


 Caution	<p>If your VIN Shuttle ends between 001 and 101 included, do not follow the next step and ask the procedure to apply to NAVYA “Supervision Service”.</p> <p>Risk of chassis deformation</p>
---	---

1. Switch on the hazard warning lights;
 - a. Automatically

The hazard warning lights come on automatically if one of two emergencies stop buttons is pressed (see [« Emergency stop »](#)).

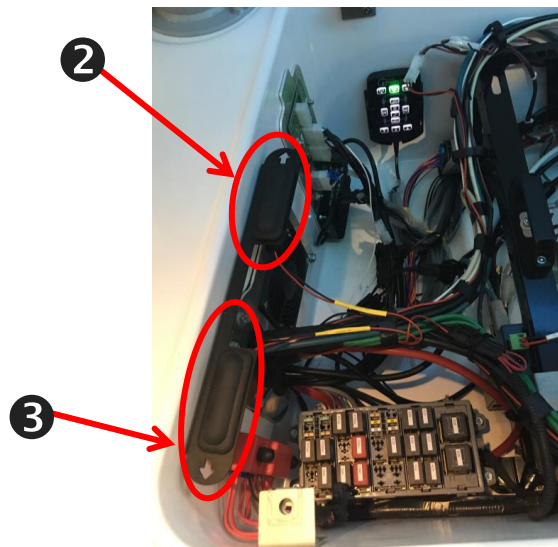
- b. Manually
 - Open the panel of the Computer Trunk (see [“Passenger Compartment Trunk”](#))

- Take the control equipment (joystick) and turn on the hazard warning lights (see « [Hazard warning lights](#) »)

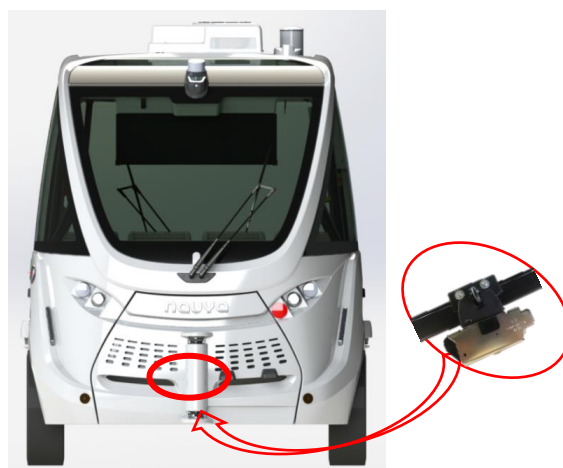
 CAUTION	Depending on the type of failure, the hazard warning lights may not light;
---	---

2. Unlock the front and rear grill;
 - a. With the 12 volts circuits working

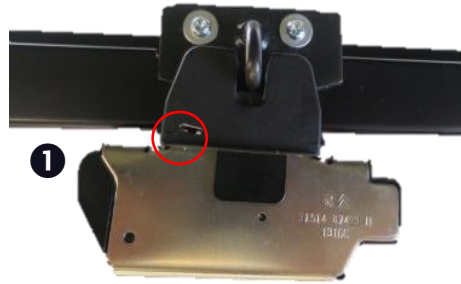
Push the button (❶) to open the High Voltage Battery Hood OR Push the button (❷) to open the Engine Hood (the choice of the hood will depend on the direction of towing).



- b. With the 12 volts circuits not working
 - Obtain a flat-blade screwdriver from the Site representative;
 - Locate the lock (❸)(accessible by the underside of the vehicle);



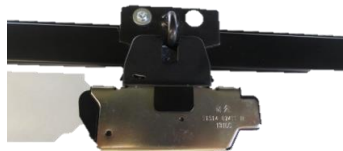
- Locate the emergency lock (1);



- Insert the flat-blade screwdriver in the emergency lock;



- Unlock the Engine Hood.



The Engine Hood is now unlocked



INFORMATION

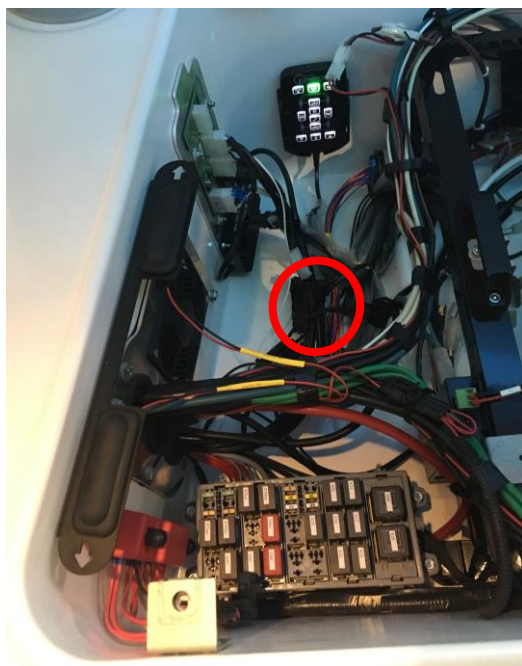
Unlocking the High Voltage Battery Hood is more difficult than the front one because of the presence of the 80 volts traction battery.

3. Align the wheels;
 - a. With the 12 volts circuit operational
 - Set the wheels straight ahead, using the “Manual Mode” of the shuttle;
 - Place chocks on either side of a wheel to prevent the shuttle moving.



b. If the control equipment is out of action


- Place chocks on either side of a wheel to prevent the shuttle moving;
 - Raise a wheel of one of two axles using a jack (consult the site representative);
 - Manually align the wheel;
 - Place the vehicle down;
 - Repeat the operation on the second axle (if necessary).
4. Put the pneumatic suspension on “High” position;
5. Disable the pneumatic suspension with the switch (I / 0) (5) to avoid height variation;



Computer trunk

6. Open the Engine Hood
7. Obtain the towing eyes from the site representative;
8. Screw the two towing eyes into their locations (6);

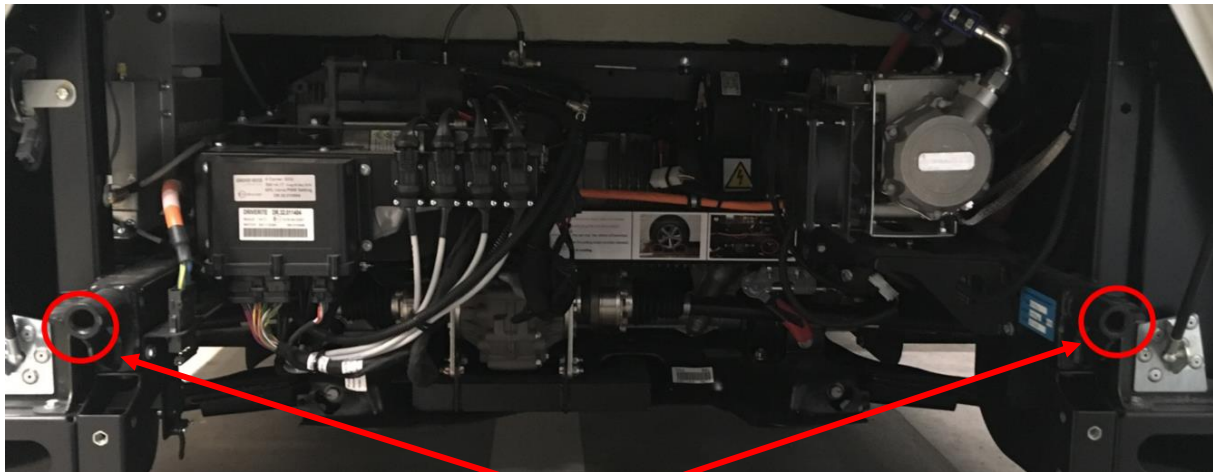


 <p>CAUTION</p>	<p>If the winch is centred on the tray, make sure to use two towing eyes and a sling to distribute the weight.</p>
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6

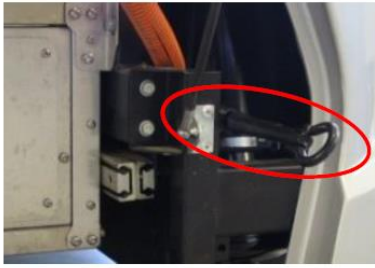
High Voltage Battery Hood



6

*Engine Hood
(According to the tow comfort)*

Right Side



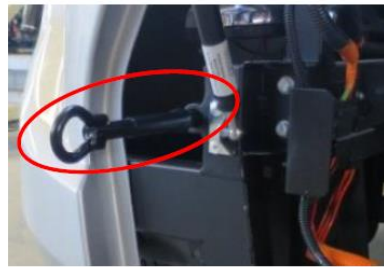
Right Side



Left Side



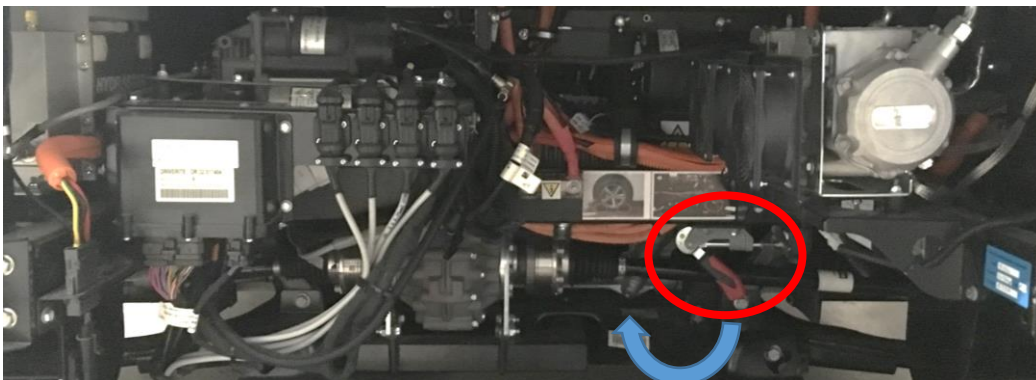
Left Side



9. Shut the shuttle down (See [“Powering OFF”](#));
10. Put the towing cable under tension with the winch;

 <p>MORTEL DANGER</p>	<p>All the brakes are disabled when the lever is operated. Risk of crushing.</p>
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11. Release the parking brake with the red lever;



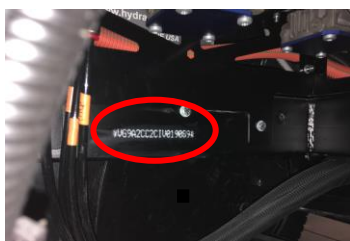
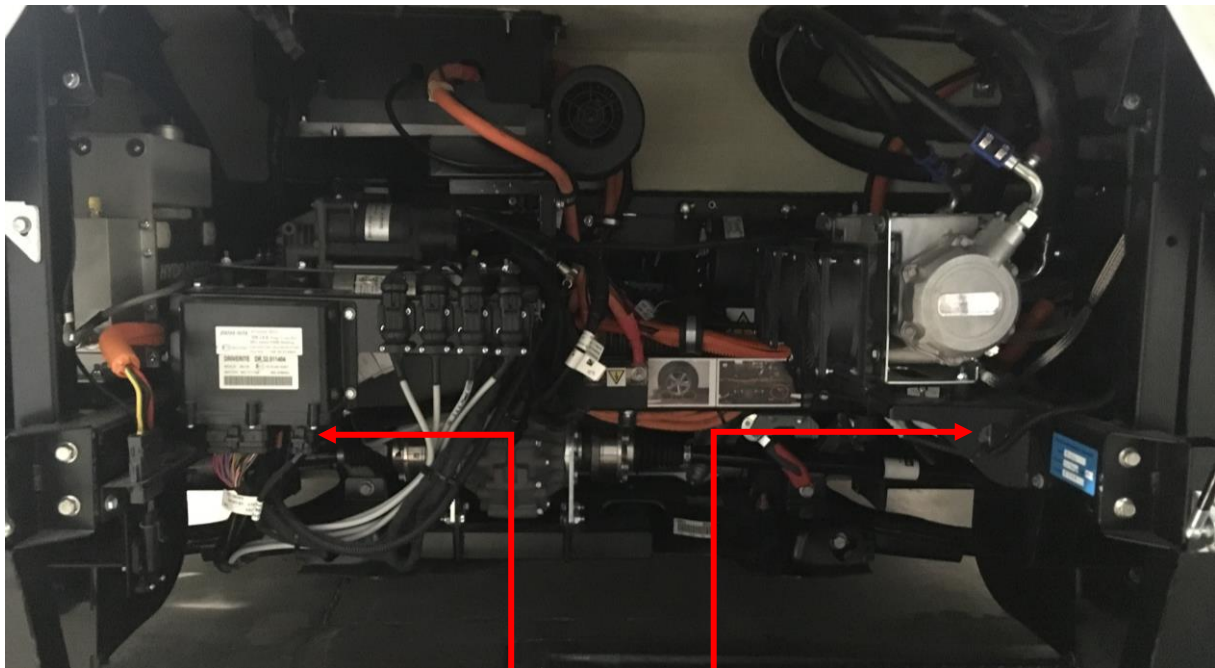
12. Remove the chocks from under the wheels;
13. Tow the shuttle onto the deck.

 INFORMATION	Only towing companies approved by NAVYA are authorized to tow the vehicle.
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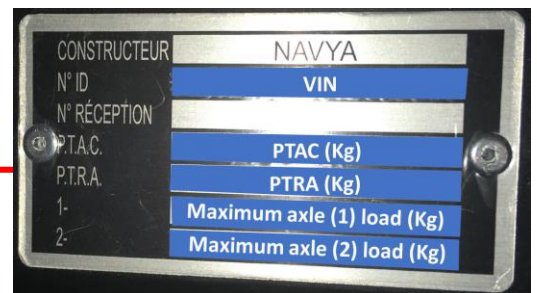
VI. TECHNICAL DATA

1-IDENTIFICATION LABEL

Manufacturer	NAVYA
Brand	NAVYA
Model	Autonom Shuttle
Designation	Autonomous shuttle People transportation



2



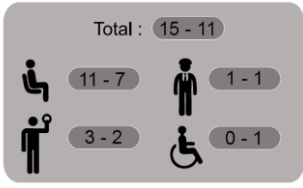
1

1	Manufacturer's Plate
2	Vehicle Identification Number

2-DIMENSIONS

Gross Vehicle Weight Rating (GVWR): - Total	3450 kg / 7606 lbs
Curb Weight - Total - Front axletree - Rear axletree	2400 kg / 5291 lbs 1020 kg / 2249 lbs 1380 kg / 3042 lbs
Overall Length	4,75 m / 187 in
Overall Width	2,11 m / 79.53 in
Overall Height	2,65 m / 104.33 in
Wheelbase	2,90 m / 114.17 in

3-CAR BODY

Type	Shuttle	
	Total	
	11	15
Seated	7	11
Standing	2	3
Operator	1	1
Wheelchair	1	0
Side Door	1 double door	
Glass Material:	Windscreen	Laminated glass
	Window side	Laminated glass
	Bay window lateral	Tempered glass
	Doors	Laminated glass
	Upper windscreen	Tempered glass
Seat belt	(Optional Equipment)	

4-POWERTRAIN

Type	Asynchronous Electric Motor
Cooling	Air
Voltage	48 V AC
Speed of revolutions max.	8000 tr/min
Power rating max.	5140 tr/min
Power	15 kW (nominal) 25 kW (peak)
Gearbox Type	Differential Reduction Gear
Ratio number (forward speed)	1
Reduction ration	1/16,1

5-MECHANICAL CHARACTERISTICS

Wheels	4
Drive wheel	2 (front axle)
Steered wheel	4 (front and rear axle)
Tire Dimension	215/60 R17C (109/107T)
Front Suspension	Double wishbone Oleo pneumatic shock absorber
Rear Suspension	Double wishbone Oleo pneumatic shock absorber
Front steering	Electric power steering
Rear steering	Electric power steering
Overall Steering Diameter	< 9 m
Brake	Hydraulic brake Spring-applied brake Regenerative brake
Parking Brake	Spring-applied brake (front axle)
Emergency brake	Hydraulic brake Spring-applied brake Regenerative brake

6-TECHNOLOGY

POSITIONING
Lidars 3D: 360° multi-layer lidars (roof)
Odometry
Lane detection and positioning
Inertial Measurement Unit
GNSS RTK: The GNSS.RTK positioning could require a base station. Compulsory for specific sites
OBSTACLE DETECTION
Lidars 3D: 360° multi-layer lidars (roof)
Lidars 2D: 180° lidars for one layer
SAFETY
Emergency stop buttons: 2 buttons (front & rear)
SOS intercom
Emergency brakes: Automatic
Loss of power brakes: Automatic
Audible sound: Yes (<i>Klaxon and buzzer</i>)

VII. CONSUMER INFORMATION

1-CONTACT

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69100 VILLEURBANNE

FRANCE

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supervision@navya.tech

2-ERRORS OR INACCURACIES / DATA EVOLUTIONS

All specifications, descriptions and requirements must be current and accurate at time of publishing. However, its content can evolve later.

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