



# ***PowerBoard®***

## ***User's Manual***

## WARNING

Thank you for choosing the PowerBoard® for your race car.

**It is essential to read this entire manual before beginning installation of your new PowerBoard®.**

The PowerBoard® is designed for use in competition-only vehicles, and should be installed by a qualified professional with suitable tools, in order to guarantee optimal performance and reliability.

The buyer, as well as any fitter chosen by the buyer, are liable for any and all consequences of the installation of the PowerBoard®. From the present moment onwards, they renounce all prejudice against ORECA or e-RACE.

The buyer and user of the PowerBoard® are responsible for confirming that the PowerBoard® itself, and its installation, are approved by the technical regulations of their specific discipline and race series.

As a reminder, use of the PowerBoard® modifies the technical characteristics and / or the performance of your vehicle, and as a result should be reserved for competition use only. The PowerBoard® is not adapted for public road use.

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## 1. GENERAL PRESENTATION

### a. Kit Contents:

The PowerBoard® kit includes:

- 1 control unit
- 1 prewired front wiring harness
- 1 prewired rear wiring harness
- 1 prewired cockpit wiring harness

If any of these elements are missing from your kit, please contact the point of sale where you purchased the product before beginning the installation.

Installation instructions are not included in the kit; however, these instructions are available for download on [www.oreca-store.com](http://www.oreca-store.com).

### b. Accessories:

Your authorized **PowerBoard®** dealer can supply you with the following elements in order to help with the installation of your PowerBoard®:

- Please consult the « Accessories » appendix.

### c. Definitions and general remarks:

In this manual:

- The term « **output** » refers to a command wire present in one of the three supplied wiring harnesses, or to one of the threaded elements at the back of the PowerBoard®.
- The term « **button** » refers to one of the push buttons on the front face of the PowerBoard®.
- The term « **switch** » refers to a toggle switch or push button (not included in this kit) connected to one of the three PowerBoard® wiring harnesses.

**All PowerBoard® outputs are protected 12V outputs. Please consult the chart at the end of this manual for more information on the preprogrammed protection thresholds.**

All « switch » type inputs are activated when the wire is grounded.

#### **d. Physical installation:**

For security reasons, the PowerBoard® must be installed in a location easily within reach for both the driver and the co-driver (if there is a co-driver) while seated in the vehicle with their harnesses securely fastened.

The fitter should verify that the three electrical contacts on the back of the PowerBoard® cannot, under any circumstances, come into contact with any metallic or carbon-fiber elements, even in case of accident.

The four mounting dampers are essential to the proper operation of the product and serve to protect the PowerBoard® from vibrations. They should not be removed under any circumstances.

The PowerBoard® is splashproof but not fully waterproof. It should not be submerged in water or sprayed with a pressure washer.

#### **e. Electrical installation:**

In rally cars, the PowerBoard® is usually installed near the central tunnel, between the driver and co-driver seats. As a reminder, the tunnel is subject to high variations in temperature, and the wiring harnesses should be properly insulated.

E-Race has chosen to use waterproof Deutsch connectors on the PowerBoard®. In order to maintain the impermeability of these connectors, any unused wires must NOT be removed. They may, however, be cut, if care is taken to protect them from contact with any and all other wires or elements.

It is also possible to use an appropriate cap to protect the connectors. References for the terminals used on the PowerBoard® are listed below:

- Contact 0462-201-16141 (RS Composants : 425-800)
- Waterproof cap 114017 (RS : 425-430)
- Clamp DMC HDT-48-00 (RS : 425-973) (It is not recommended to weld the wires to the terminals)

#### **f. Ground:**

The ground wire, included in the "Rear wiring harness" kit of the PowerBoard®, must be connected to the body of the vehicle, in a location with no paint and no rust present.

If the ground wire comes in contact with either paint or rust, the PowerBoard® will function erratically, and some elements risk being damaged.



## 2. INSTALLATION

### a. Circuit Breaker:

Connections:

On the rear face of the PowerBoard®, you will find three threaded elements:

- M8 thread: To connect to the battery. (This is the entry to the PowerBoard®'s internal circuit breaker). Tighten to 15 Nm maximum.
- M10 thread: To connect to the alternator and the ignition. (This is the output of the PowerBoard®'s internal circuit breaker.) Tighten to 25 Nm maximum.
- M6 thread: "Power output" (Please consult the chapter dedicated to this element). Tighten to 6 Nm maximum.

Operations:

The circuit breaker is activated by pressing the button labeled "Main Switch" for one second.

It is deactivated by pressing the button labeled "Main Switch" a second time, or when the "Circuit Breaker Switch" wire is grounded.

The switch used for the « Circuit Breaker Switch » function can be a waterproof push button, or a waterproof toggle switch. No matter the type of switch used, power to the vehicle will be cut off immediately when the switch is activated.

Attention, if the « Circuit Breaker Switch » remains grounded, it is impossible to reactivate the current.

Note :

If the PowerBoard® is not in « forced operation » mode, it will automatically shut down after 10 minutes without any commands from the fuel pump.

## b. “Power output”:

Connections:

The rear face of the PowerBoard® features a threaded element with M6 thread. This output is the “Power output”, with a maximum tightening torque of 6 Nm. The output allows for the use of devices with a continuous current up to 70 amperes, or a peak current of 165 amperes. A few examples: power steering, water pump, etc.

A protected 12V plug for the device to be connected to the “Power output” is included in this kit.

WARNING: fire safety is essential. Please use heavy-gauge cable, and carefully isolate the wire along its entire length.

**FIRE HAZARD!**

Operations:

The “Power output” is active from the first touch of the “Start Engine” button, until the PowerBoard® is turned off.

## c. Lighting:

Connections :

For all lighting, please connect bulbs directly to one of the protected 12V wire supplied by PowerBoard®, and ground the connection.

Operations:

When the rotary control is in “OFF” position, it is only possible to flash headlights. Other headlight functions are not operational.

The rotary control turns on the following lights, in order: position lights, low beams, and exterior lamp pods.

In order to trigger an automatic flash of the headlights (two flashes per second), press and hold the “Headlights” button.

Pressing the “Headlights” button will turn on the main headlights if the rotary control is in low beam position; pressing the “headlights” button will turn on the exterior lamp pod if the rotary control is in exterior lamp pod position. Pressing the “Headlights” button a second time will turn off the same lights.

Grounding the “Headlight switch” wire will produce the same result as pressing the “Headlight” button. Doing so allows a push button command to be installed on the steering wheel and/or on the co-driver footrest in order to easily access the headlight commands.

The low beams cannot be turned on when the rotary control is in OFF position.

During cranking, the PowerBoard® cuts power to all lights except for the position lights in order to minimize drain on the battery. Front headlights and fog lights must be manually re-activated by the driver.

#### **d. Turn signals:**

Connections:

In order to command turn signals, simply connect the bulbs directly to one of the protected 12V wire provided by PowerBoard®, and ground the connection.

Operations:

Pressing the buttons “Right turn signal” or “left turn signal” will cause the chosen turn signal to blink on and off for 10 seconds. In order to stop the blinking before the 10 seconds have passed, simply press the button a second time.

Pressing the “right turn signal” and “left turn signal” buttons simultaneously will cause both left and right turn signals to blink for an unlimited duration, otherwise known as the warning or hazard lights.

#### **e. Stop Lights:**

Connections:

In order to command the stop lights, simply connect the bulbs directly to one of the protected 12V wire provided by PowerBoard®, and ground the connection.

The “switch stop” wire must be temporarily grounded by a manocontact on the hydraulic circuit, or by a switch on the pedal.

Operations:

When the « switch stop » wire is grounded, the stop lights are activated.



## **f. Reverse Lights:**

Connections on vehicles with sequential gear boxes and CAN-Bus :

In order to command the reverse lights, simply connect the bulbs directly to one of the protected 12V wire provided by PowerBoard®, and ground the connection.

Connections on all other vehicles:

The “reverse light” wire must pass through a reverse gear contactor, then can be connected to the bulbs.

Operations:

For vehicles with a sequential gear box and CAN-Bus connection to the PowerBoard®, the reverse lights are activated when the vehicle is in reverse gear.

For all other vehicles, the reverse lights are activated when the reverse gear contactor allows the 12V current to pass to the bulbs.

## **g. Fuel Pumps:**

Connections:

For high pressure and/or fuel boost pumps, simply connect the pump(s) directly to one of the protected 12V wire provided by PowerBoard®, and ground the connection.

Operations:

The two fuel pump outputs are automatically activated five seconds after power up. They are also activated during ignition.

The fuel pump outputs remain active in the following situations:

- When the “Fuel pump command” wire is grounded (normally the fuel pump output of the vehicle’s calculator grounds the wire if necessary).

OR

- When the PowerBoard® receives a signal through the CAN-Bus of rotations greater than 0 RPM (for more information, consult chapter 3, CAN-Bus).

In all situations, the wired commands take priority over information from the CAN-Bus. As a result, it is possible to force operation with a switch or a button, even if the CAN-Bus is connected.

If a valid CAN-Bus signal has been received at any time, the PowerBoard® will force operation of the fuel pumps if the CAN-Bus signal is interrupted at a later time.

At any moment, the driver or co-driver can force operation of the fuel pumps by pressing and holding (for more than 3 seconds) the « Force ON » button.

#### **h. Engine fan:**

Connections:

In order to command the engine fan, simply connect the fan directly to one of the protected 12V wire provided by PowerBoard®, and ground the connection.

It is important to check the direction of rotation of the fan; if the fan does not turn in the correct direction, inverse the 12V and ground connections.

Operations:

The PowerBoard® activates the fan in the following situations:

- When the “Fan command” wire is grounded (normally the fan output of the vehicle’s calculator grounds the wire if necessary).

OR

- When the “Fan command” wire is connected to a Bosch sensor with 2500 ohms at 20°C (for example, part number 0 280 130 026), and the temperature is greater than 88°C (stop at 85°C).

OR

- When the PowerBoard® receives a signal through the CAN-Bus of a temperature greater than 88°C (stop at 85°C; for more information, consult chapter 3, CAN-Bus).

In all situations, the wired commands take priority over information from the CAN-Bus. As a result, it is possible to force operation with a switch or a button, even if the CAN-Bus is connected.

If a valid CAN-Bus signal has been received at any time, the PowerBoard® will force operation of the engine fan if the CAN-Bus signal is interrupted at a later time.

At any moment, the driver or co-driver can force operation of the fuel pumps by pressing and holding (for more than 3 seconds) the « Force ON » button.

### i. Windscreen Wipers:

Attention: motors directed by LIN-Bus are not compatible with the PowerBoard®.

How to connect a temporary current motor with wiper position sensor:

PowerBoard® controls the current to the windscreen wiper motor at all times, except when the “resting switch” wire is grounded.

The motor should be connected to both the “windscreen wiper power” output and the ground.

The “resting switch” wire should be connected to both the wiper position sensor and the ground.

How to connect a temporary current motor with permanent power supply:

For this type of motor, the “resting switch” wire should always be grounded.

The “windscreen wiper power” output of the windscreen wiper motor should be connected to the motor’s temporary current input. The motor should also be grounded.

This type of motor requires constant current to bring the wipers back to resting position. The current can come from a memorized Auxiliary output (please see Auxiliary chapter), or directly from the circuit breaker via a 15 amp fuse (for example, if the Auxiliary output is being used for another application).

Operations:

The windscreen wipers are activated in the following situations:

- When the “windscreen wiper” wire is temporarily grounded (the driver or co-driver can choose, in order, intermittent wipers, constant wipers, then stopped wipers).

It is possible to add a push button on the steering wheel and/or on the co-driver footrest in order to easily access the wipers.

OR

- When the “intermittent wiper” button is pressed

OR

- When the “constant wiper” button is pressed

OR

- When the wiper fluid button is pressed. The wipers will continue for 4 seconds after the wiper fluid pump has stopped.

Please note:

When the PowerBoard® is turned on, the windscreen wipers will be activated if the “resting switch” wire is not grounded. In this case the PowerBoard® will try to return the wipers to their resting position.

#### j. Windscreen Wiper Fluid Pump:

Connections:

In order to command the wiper fluid pump, simply connect the wiper fluid pump directly to one of the 12V wire provided by PowerBoard®, and ground the connection. It is important to check the direction of rotation on the pump; if the pump does not turn in the correct direction, inverse the 12V and ground connections.

Operations:

The wiper fluid is activated in the following situations:

- When the « wiper fluid switch » wire is grounded. It is possible to add a push button control on the steering wheel and/or on the co-driver footrest in order to easily access the wiper fluid.

OR

- When the « wiper fluid » button is pressed.

The PowerBoard® will activate the pump for one second before starting the windscreen wipers. The wipers will remain active for 4 seconds after the fluid pump stops.

#### k. Demisting:

Connections:

In order to command the demisting fan, simply connect the demisting fan motor directly to one of the 12V wire provided by PowerBoard®, and ground the connection.

It is important to check the direction of rotation of the fan; if the fan does not turn in the correct direction, inverse the 12V and ground connections.

Operations:



The demisting fan is activated when the driver or co-driver press the « Demisting » button.

During cranking, the PowerBoard® cuts power to the demisting fan in order to save battery. The driver must turn the demisting fan back on manually after cranking.

### **I. Starter:**

Connections:

Power supply to the starter should come through a wire with an important cross-section, either directly from the battery or from the battery cut-off switch output “Alternator/Starter.” If the power supply comes from the battery cut-off switch, attention: the current should not exceed 220A.

Current to the starter is carried through the “Starter Solenoid” wire.

Operations:

The starter is activated when the driver or co-driver presses the « Start Engine » button.

### **m. Alternator:**

Connections:

The alternator should be connected to the battery cut-off switch output “Alternator/Starter.”

### **n. Horn:**

Connections:

In order to command the horn, simply connect the horn directly to one of the 12V wire provided by PowerBoard®, and ground the connection.

Operations:

The horn is activated by pressing the “Horn” button on the PowerBoard®.

### **o. Auxiliary:**

This auxiliary function can be used for any non-standard application chosen by the installer or the driver. Some examples: camera, oil cooler fan, 12V constant windscreen wipers, etc.



## Connections:

In order to command the auxiliary function, simply connect the function of your choice directly to one of the 12V wire provided by PowerBoard®, and ground the connection.

## Operations:

The auxiliary function is activated by pressing the “Aux” button. In order to stop the auxiliary function, simply press the “Aux” button a second time.

The auxiliary output is a memorized output: this means that if the function is activated when the PowerBoard® is shut down, it will remain active when the PowerBoard® is turned back on, and vice versa.

### **3. CAN-Bus MANAGEMENT**

If your vehicle is equipped with a programmable competition-only calculator, it is often possible to control the fuel pump and fan functions through multiplexing.

This function is compatible with all e-RACE control units sold since 2012, except the Club 2012 and First models.

For use with all other calculators, please send the following message:

Speed: 500 kbits  
Type: little endian  
Address: 610h

Octet 1 : Upper RPM's  
Octet 2 : Lower RPM's  
Octet 3 : Not applicable for this application (set 0)  
Octet 4 : Not applicable for this application (set 0)  
Octet 5 : Water Temperature  
Octet 6 : Not applicable for this application (set 0)  
Octet 7 : Not applicable for this application (set 0)  
Octet 8 : Gear Engaged

## Revolutions:

16 bits, between 0 and 65535 RPM's, offset 0, gain 1

## Water temperature:

8 bits, between -40 and 215°C, offset -40, gain 1

## Gear engaged:

8 bits, between -1 and 254, offset -2, gain 1  
(0 = Error; 1 = Reverse; 2 = Neutral; 3 =  
First gear; 4 = Second gear; Etc.)



#### 4. TROUBLESHOOTING:

The PowerBoard® automatically protects its outputs against overheating and currents exceeding what is recommended.

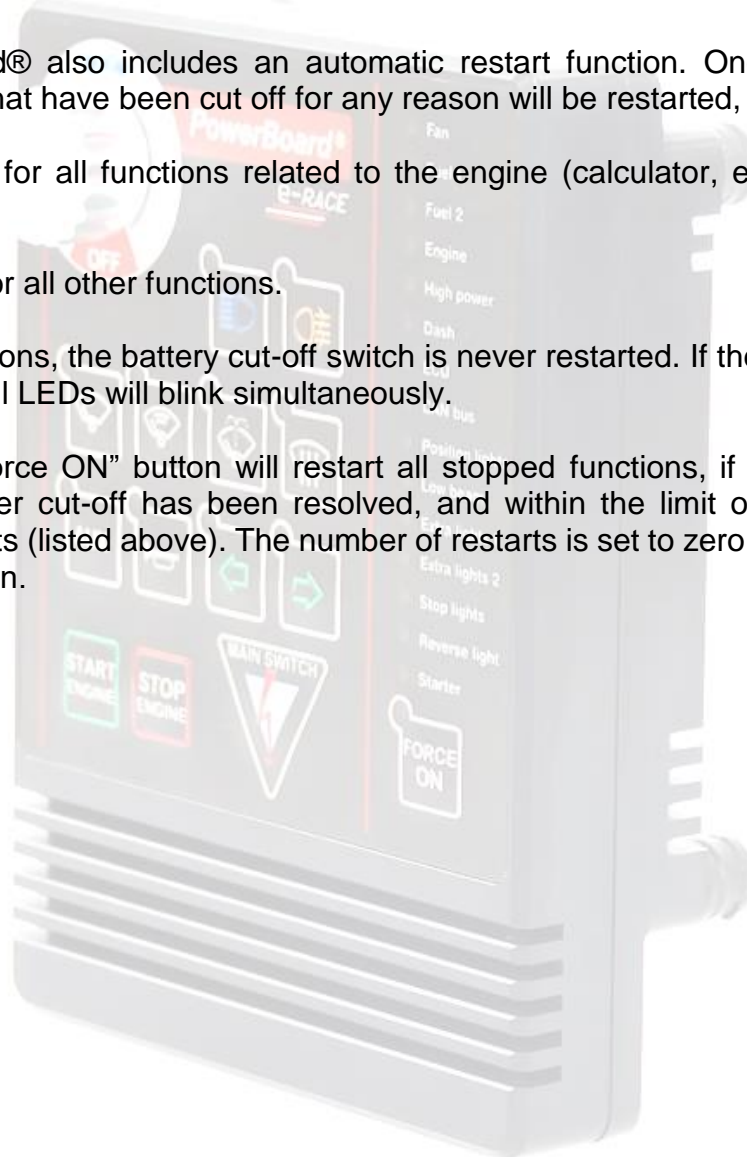
If one or more outputs are detected with temperature or current exceeding the maximum recommended values, they will immediately and automatically be cut off, and the corresponding LEDs on the face of the PowerBoard® will begin flashing in order to alert the driver and/or co-driver.

The PowerBoard® also includes an automatic restart function. Once per second, default outputs that have been cut off for any reason will be restarted, up to:

- 10 times for all functions related to the engine (calculator, engine, fan, fuel pumps)
- 3 times for all other functions.

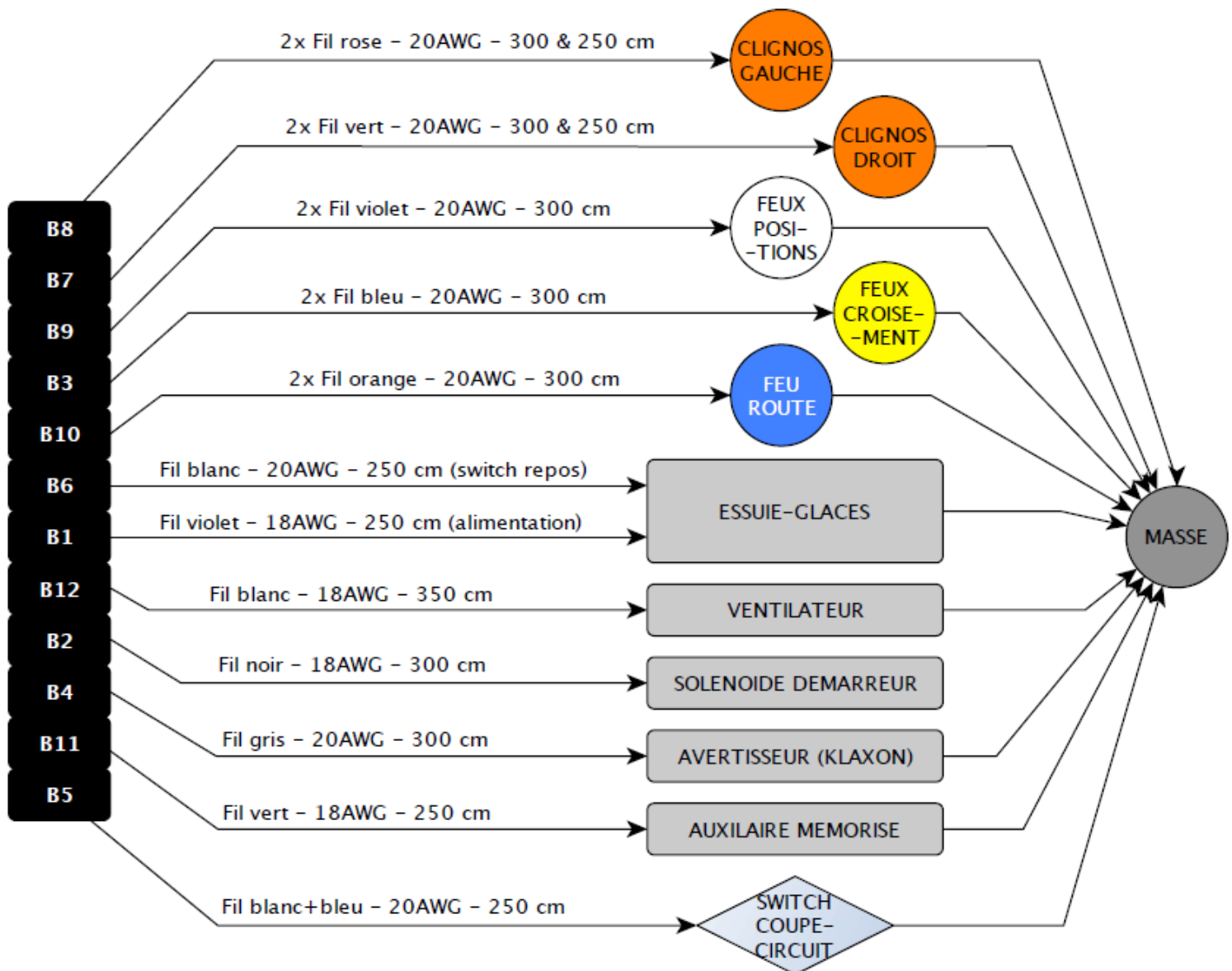
For security reasons, the battery cut-off switch is never restarted. If the PowerBoard® cuts off power, all LEDs will blink simultaneously.

Pressing the “Force ON” button will restart all stopped functions, if the default that caused the power cut-off has been resolved, and within the limit of the maximum number of restarts (listed above). The number of restarts is set to zero by pressing the “Force ON” button.

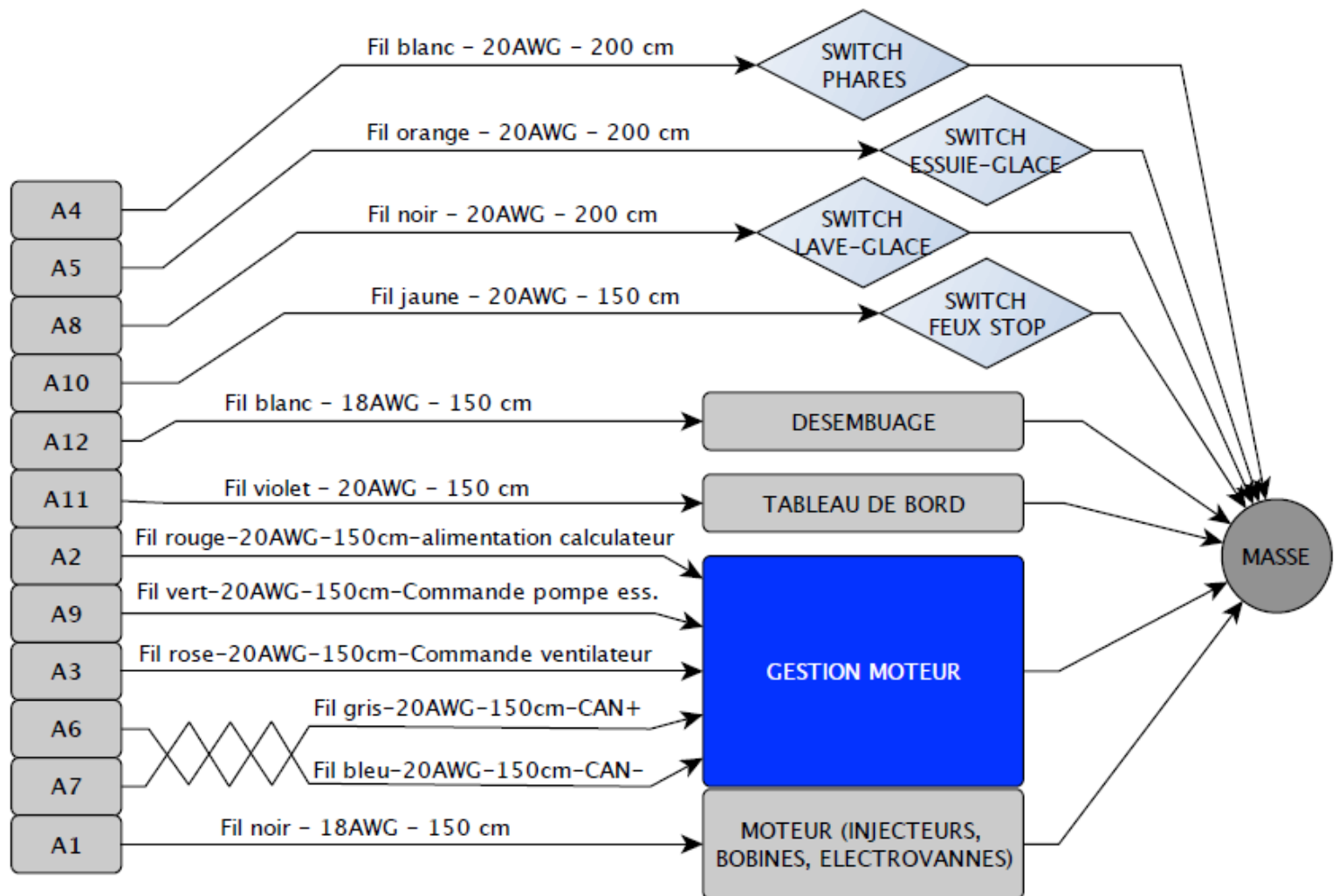


## 5. WIRING SCHEME

### a. Front Wiring Harness

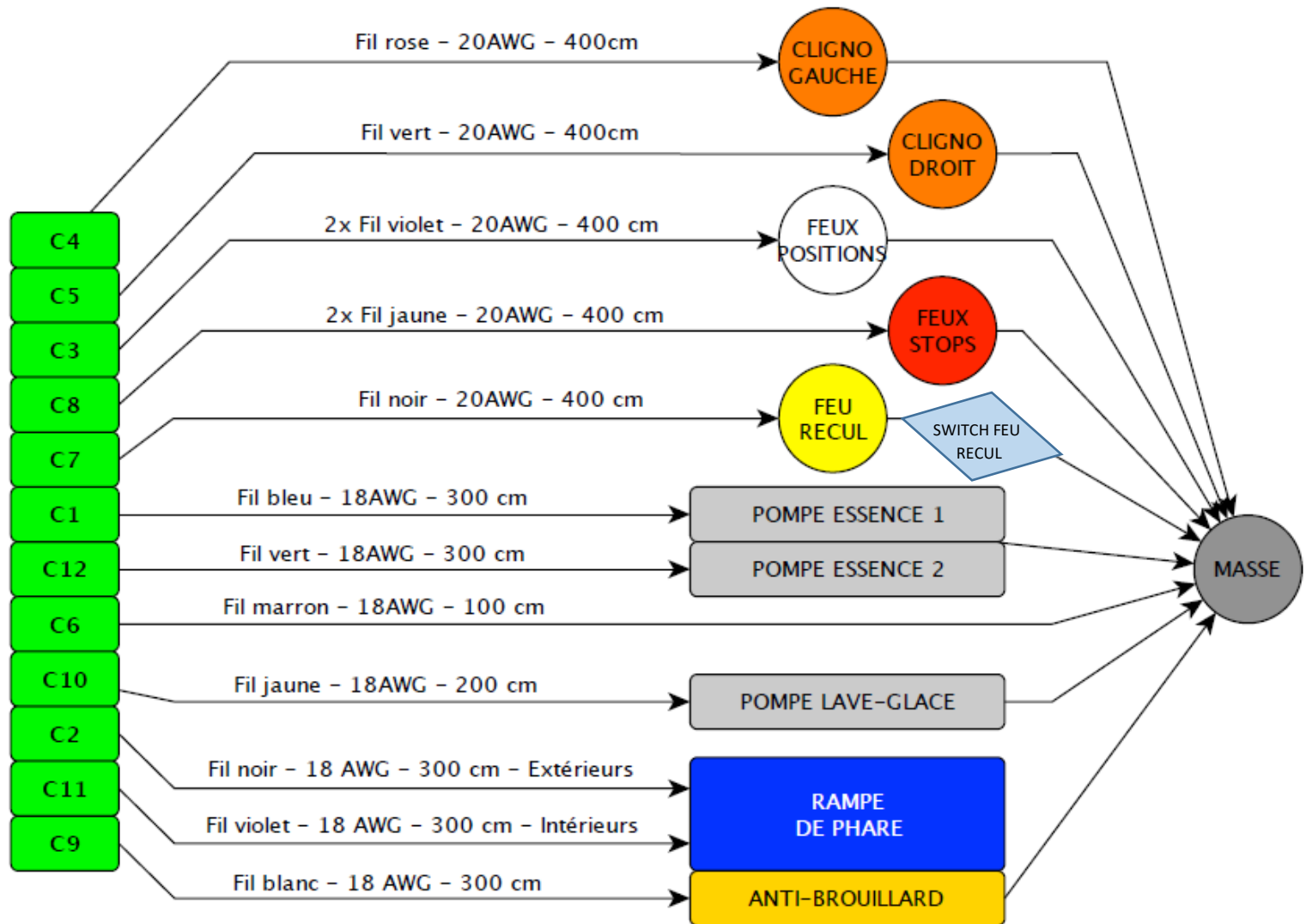


## b. Cockpit Wiring Harness





### c. Rear Wiring Harness



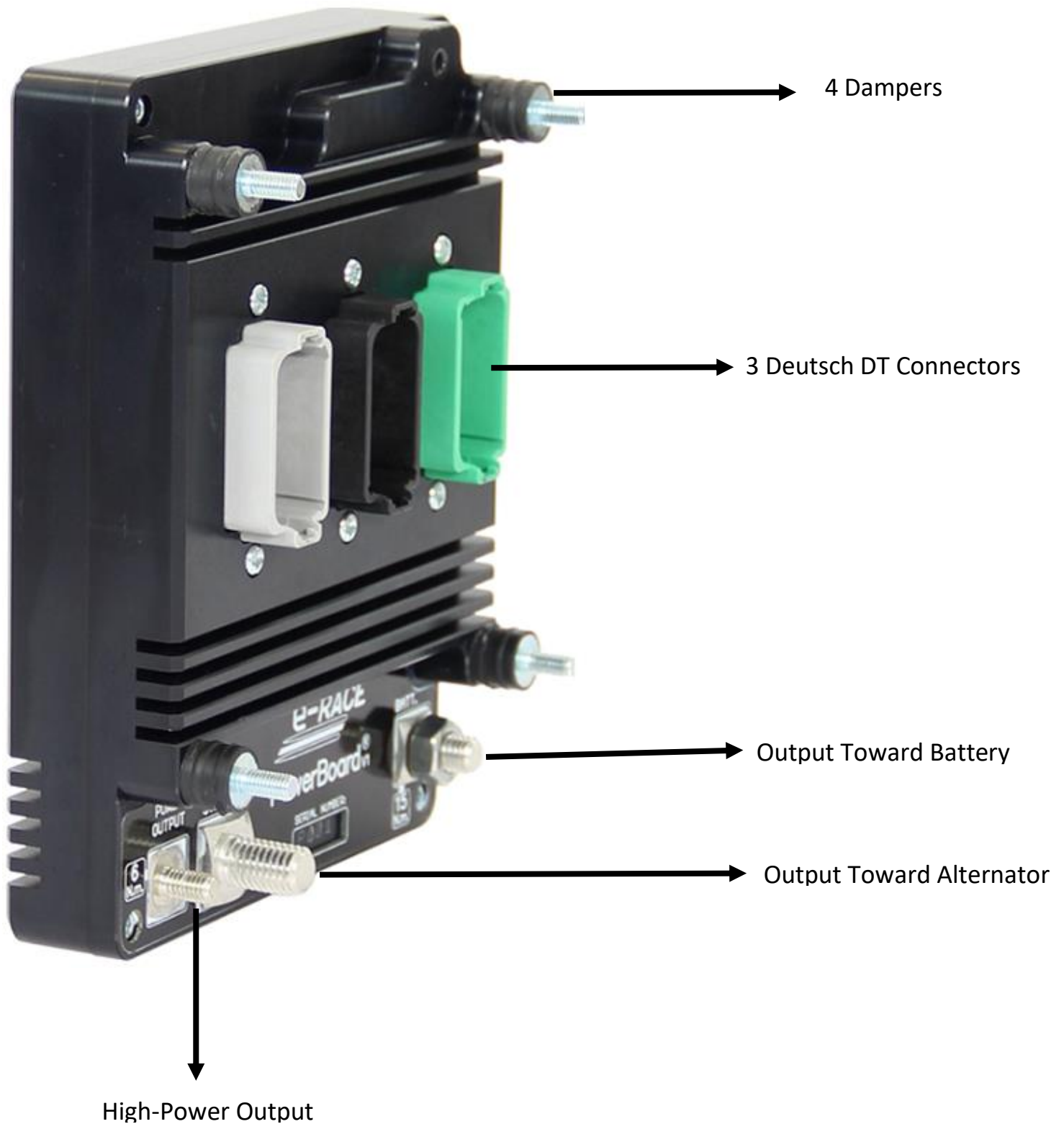
## 6. FRONT FACE DETAIL

“Automatic” Commands  
(Example : fuel pumps activated during ignition)



15 manual commands for Driver and/or Co-Driver:  
1 rotary control, 1 “Force On” button, and 13 command buttons

## 7. REAR FACE DETAIL



## 8. ANNEX – ACCESSORIES

Please find below a list with several suggestions for accessories that are fully compatible with your PowerBoard®. Although not required for proper operation of the PowerBoard®, they will allow you to best take advantage of its capacities.

### - FULLY EQUIPPED CONTROL PANEL (CENTRAL TUNNEL MOUNTING)

Part number 8RS00169

<http://www.oreca-store.eu/console-de-demarrage-redspec-universelle-montage-tunnel-central.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&store=2>

### - FULLY EQUIPPED CONTROL PANEL (DASHBOARD MOUNTING)

Part number 8RS00170

<http://www.oreca-store.eu/console-de-demarrage-redspec-universelle-montage-tableau-de-bord.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&store=2>

### - ALLOY HEAT SCREEN 50CM/60CM/3MM

Part number 634160

Necessary if the PowerBoard® is mounted above the central tunnel.

<http://www.oreca-store.eu/dei-heat-screen.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&store=2>

### - WATERPROOF EXTERNAL SWITCH

Part number 616LL942100002

Necessary to activate the battery cut-out switch from outside the vehicle.

<http://www.oreca-store.eu/lifeline-external-waterproof-switch-for-fire-extinguisher-systems.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&store=2>

### - CARBON STEERING WHEEL 2-BUTTON COMMAND KIT

Part number 8TO0090C2

<http://www.oreca-store.eu/kit-boutons-poussoirs-turn-one-carbone-2-boutons.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&store=2>

### - SPIRAL CABLE, STEERING WHEEL - DASHBOARD

Part number 12ORE210BK

### - TUBULAR TERMINALS FOR BATTERY CUT-OUT SWITCH

Part number E1653 - M10 Cable 16 mm<sup>2</sup>

Part number E1655 - M6 Cable 25 mm<sup>2</sup>

Part number E1656 - M8 Cable 25 mm<sup>2</sup>

[http://www.oreca-store.eu/starter-terminals-for-batteries-or-battery-cut-out-switches.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/starter-terminals-for-batteries-or-battery-cut-out-switches.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- 25MM<sup>2</sup> BATTERY CABLE, SOLD BY METER

Part number E1504 – Black

Part number E1504R – Red

[http://www.oreca-store.eu/25-mm2-battery-cable.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/25-mm2-battery-cable.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- CABLE OVERBRAID Ø 4 TO 27MM

Part number 1772-004-100 (WT4 - 4 to 8 mm)

Part number 1772-008-100 (WT8 - 8 to 16mm)

Part number 1772-010-100 (WT10 - 10 to 20mm)

Part number 1772-015-50 (WT15 - 15 to 27mm)

[http://www.oreca-store.eu/cable-overbraid.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/cable-overbraid.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- WURTH BLACK INSULATED TAPE 15MM X 10M, 0.15MM THICKNESS

Part number 19856

[http://www.oreca-store.eu/ruban-isolant-wurth.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/ruban-isolant-wurth.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- HEAT SHRINK TUBING – 180 UNITS

Part number 77041

[http://www.oreca-store.eu/kit-gaines-thermoretractables-gunson-180-pieces.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/kit-gaines-thermoretractables-gunson-180-pieces.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- BLACK ZIP TIES

Part number 0502-211 – 2,4 x 92 mm

Part number 0502-221 – 3,6 x 140 mm

Part number 0502-231 – 4,8 x 186 mm

Part number 0502-241-0 – 4,8 x 360 mm

[http://www.oreca-store.eu/black-rilsan-zip-tie.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&\\_\\_store=2](http://www.oreca-store.eu/black-rilsan-zip-tie.html?SID=vt0jn8dlfcg2ket5q19k5f5po4&__store=2)

- RILSAN ZIP TIE BASE 19X9.5MM

Part number 460335

