



TELEMETRY

Briefing

1. Overview & Integration
2. Mounting Guidelines
3. Telemetry Race Processes



<https://telemetry.sem-app.com>

Shell
Eco-marathon

Student Data and Technology
Portal

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student_documentation:intro

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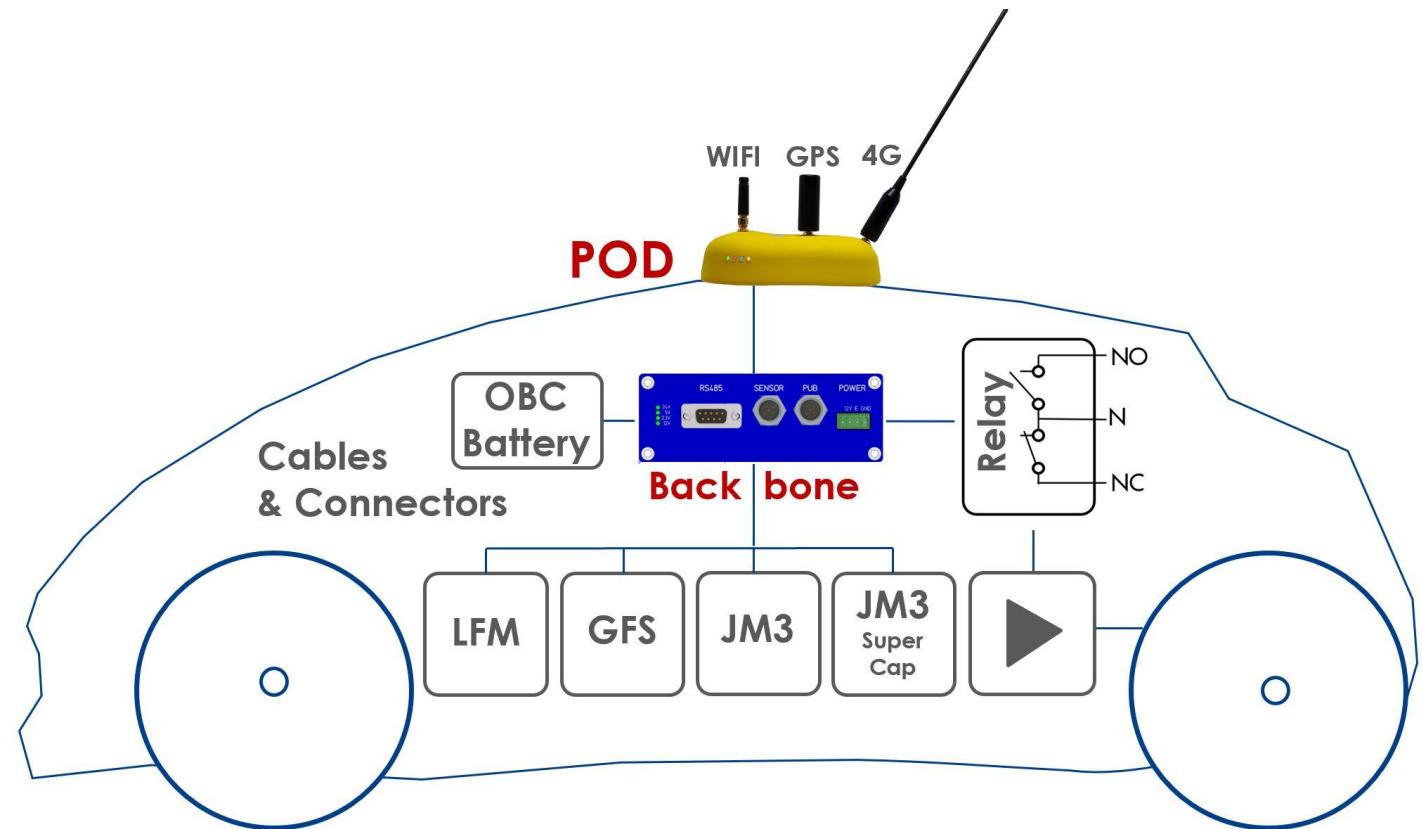
[Frequently Asked Questions](#)

Info Point

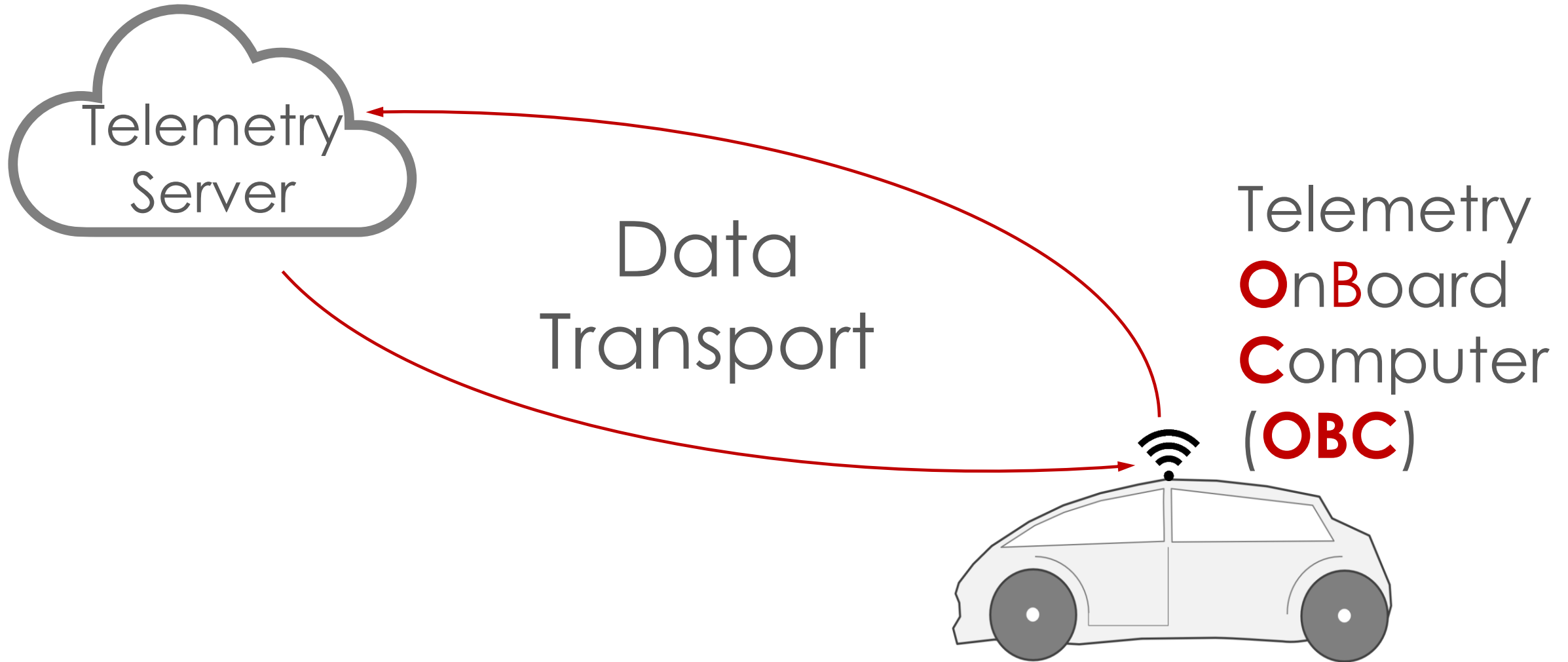
FAQ

WIKI

Student Documentation



What is Telemetry?



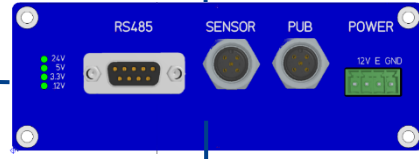
Telemetry Overview

OBC POD

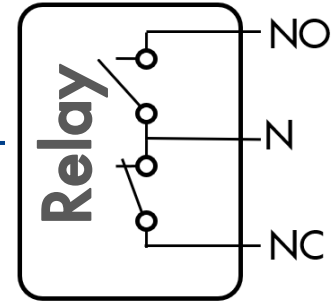
Antennae



OBC Battery



OBC Back bone



Telemetry Inspection Checklist

Telemetry Briefing Ticket

BE 714

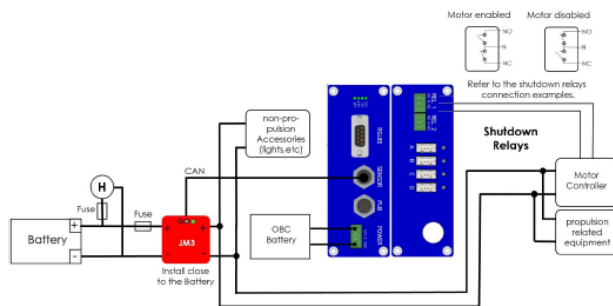
Takes place
first, continuously
(later, on demand)

Send to this briefing, your:
- **Team Manager**
- **Technical Specialist**

Remember:

- Do NOT come to the **Telemetry Inspection**, until the **Self-Inspection Checklist** has been completed
- Check the **batteries** before entering the track
- Always **charge** the batteries
- Switch **ON** telemetry in **Start** area
- Switch **OFF** telemetry after **Finish** area

IMPORTANT: Do not switch off telemetry at **Finish** line!



Self-Inspection Checklist

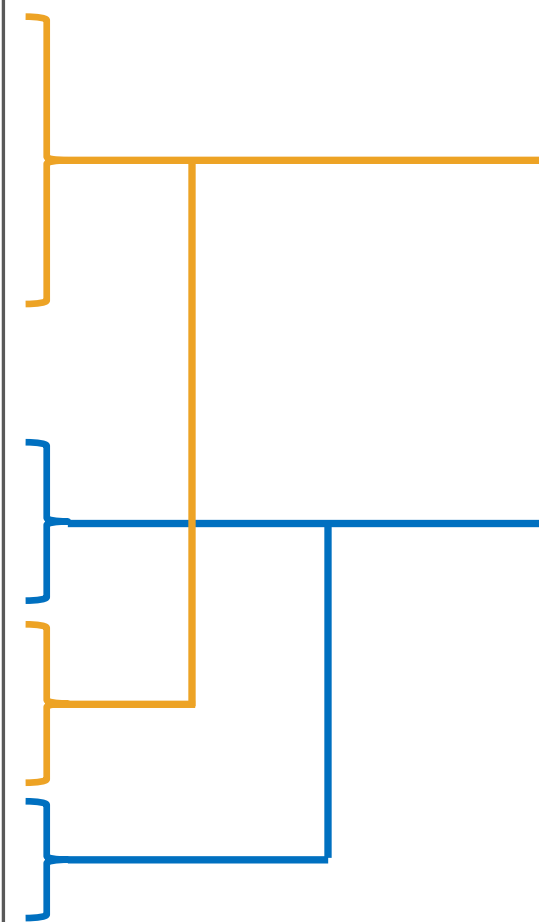
Do not come to Telemetry Inspection until all boxes checked

- OBC-Pod** mounted correctly
 - OBC Pod unobstructed field of view of 90° to all sides
 - OBC Pod < 20° off horizon (pitch & roll)
 - OBC Pod in driving direction
 - OBC Pod 10cm of cable lift available (a fist)
- OBC Backbone** mounted correctly
- Battery** mounted correctly
 - removable to the side or up, no tapes
 - > 60% of charge
- Sensors** mounted correctly
 - JM3 LED-check (Status: Green, Battery: Amber/Green)
 - JM3 Buttons accessible, LEDs visible
- Cables** mounted correctly
 - No wide loops in cables
 - Cables mounted securely
 - Strain reliefs applied
 - Connectors fastened (check the «click» at the end)
- No direct electrical connection** of OBC to car body or chassis
- OBC working properly**
 - LEDs after 1min = Green Off Blue Yellow ●●●●
- Shutdown Relay** working properly
 - Start engine (if not yet running)
 - Simulate relay with supplied electronic switch
 - Engine stops

Team	Date	Name	Signature	Inspector
714				

Energy specific

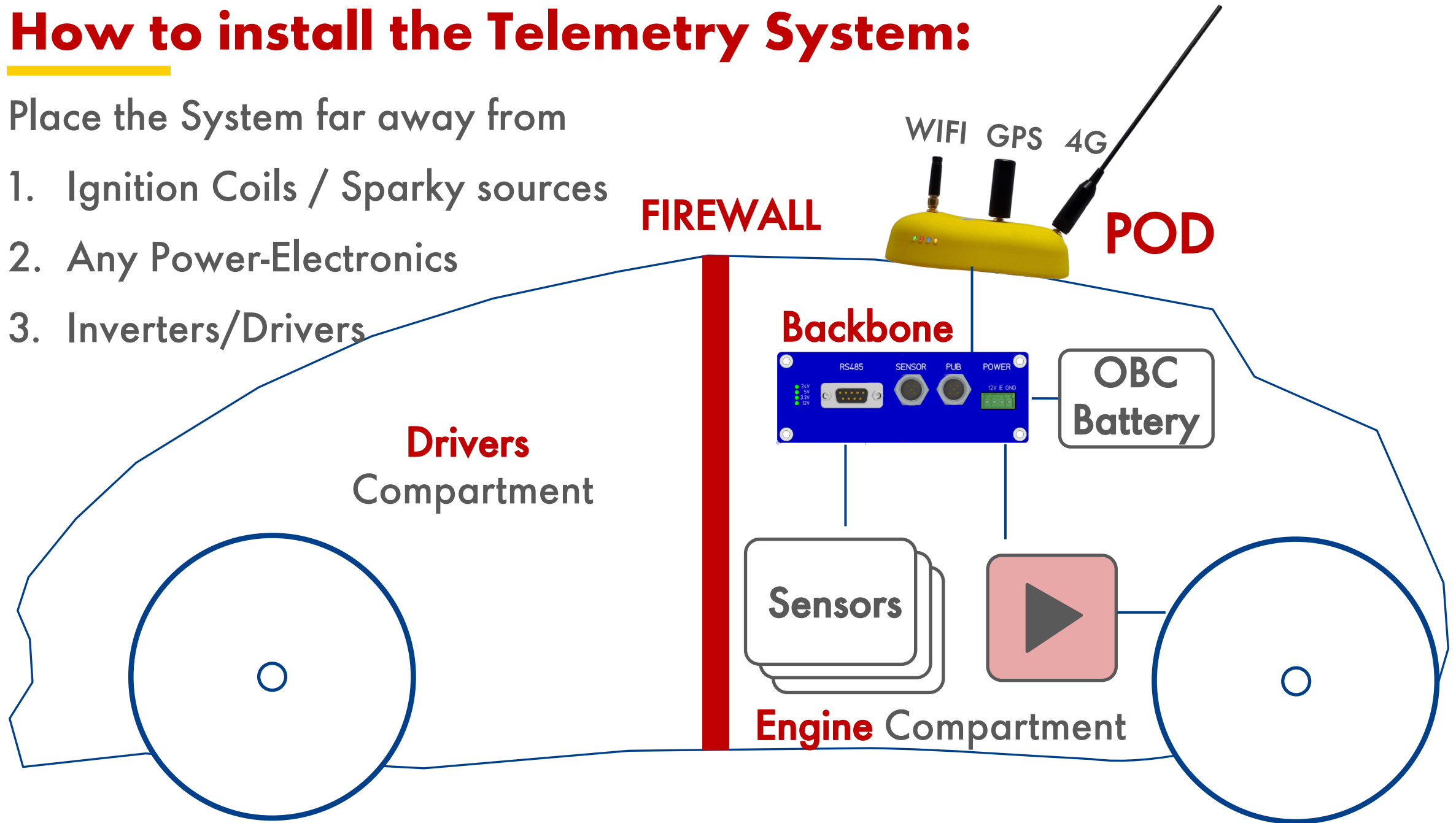
Generic



How to install the Telemetry System:

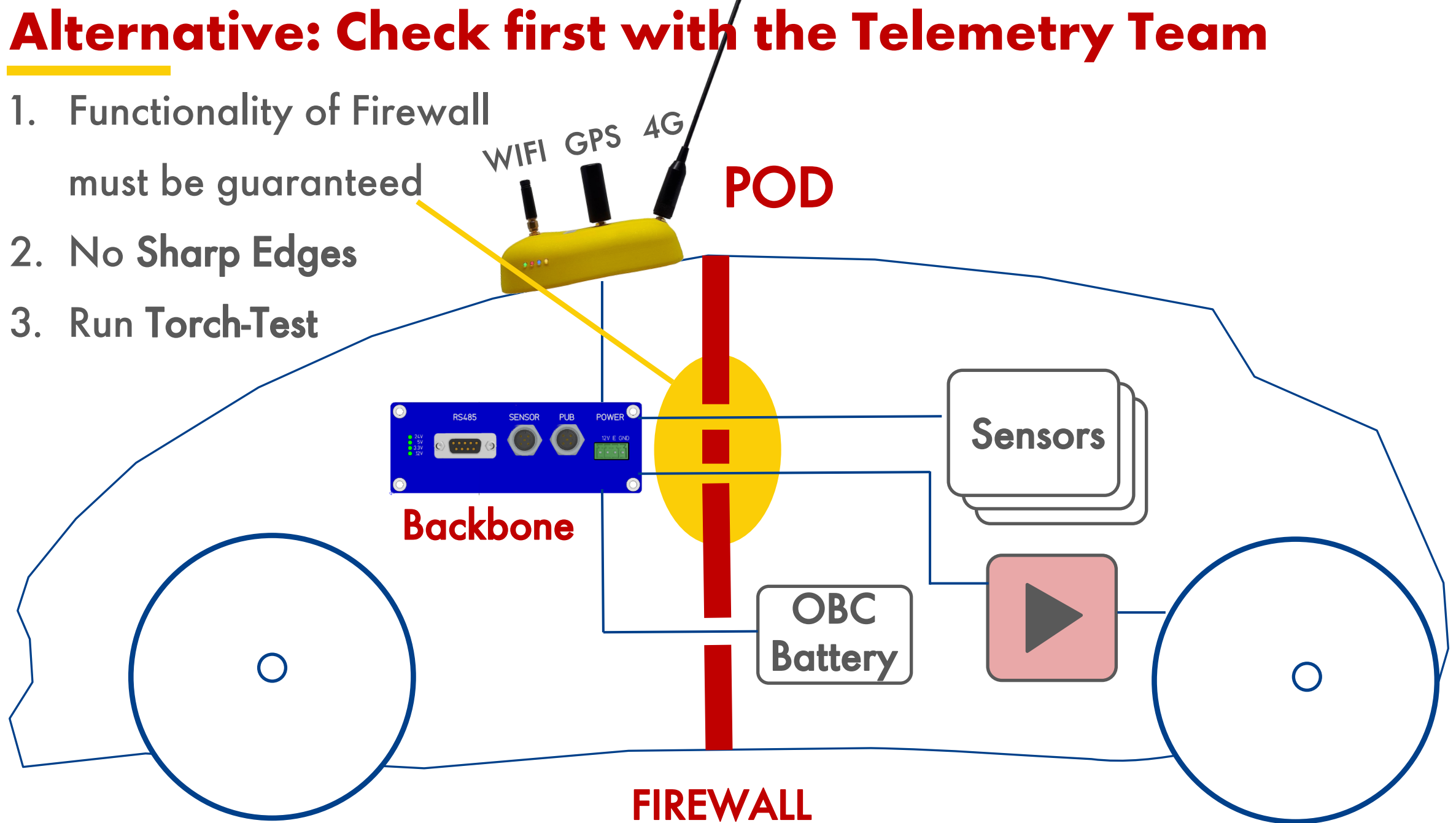
Place the System far away from

1. Ignition Coils / Sparky sources
2. Any Power-Electronics
3. Inverters/Drivers



Alternative: Check first with the Telemetry Team

1. Functionality of Firewall must be guaranteed
2. No Sharp Edges
3. Run Torch-Test

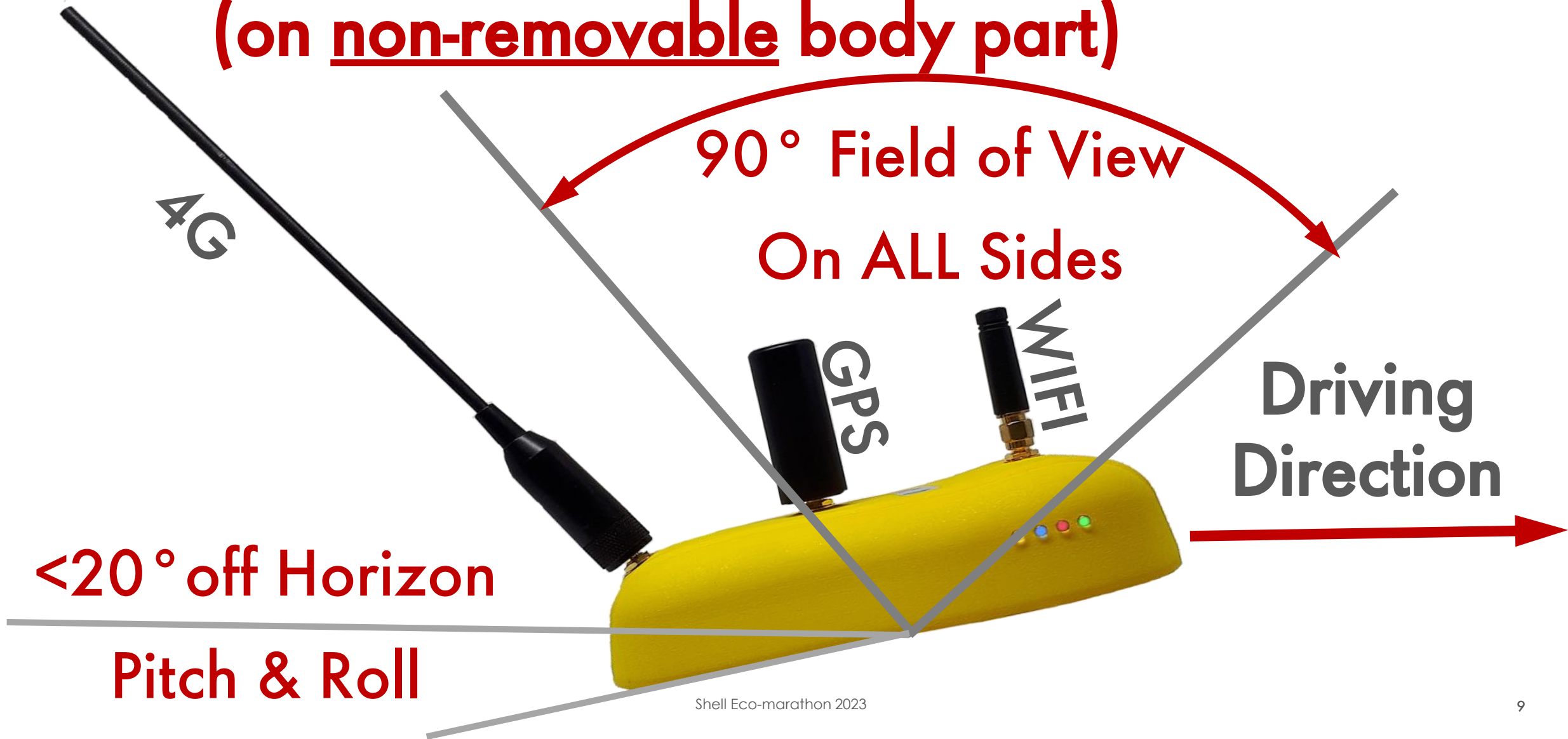


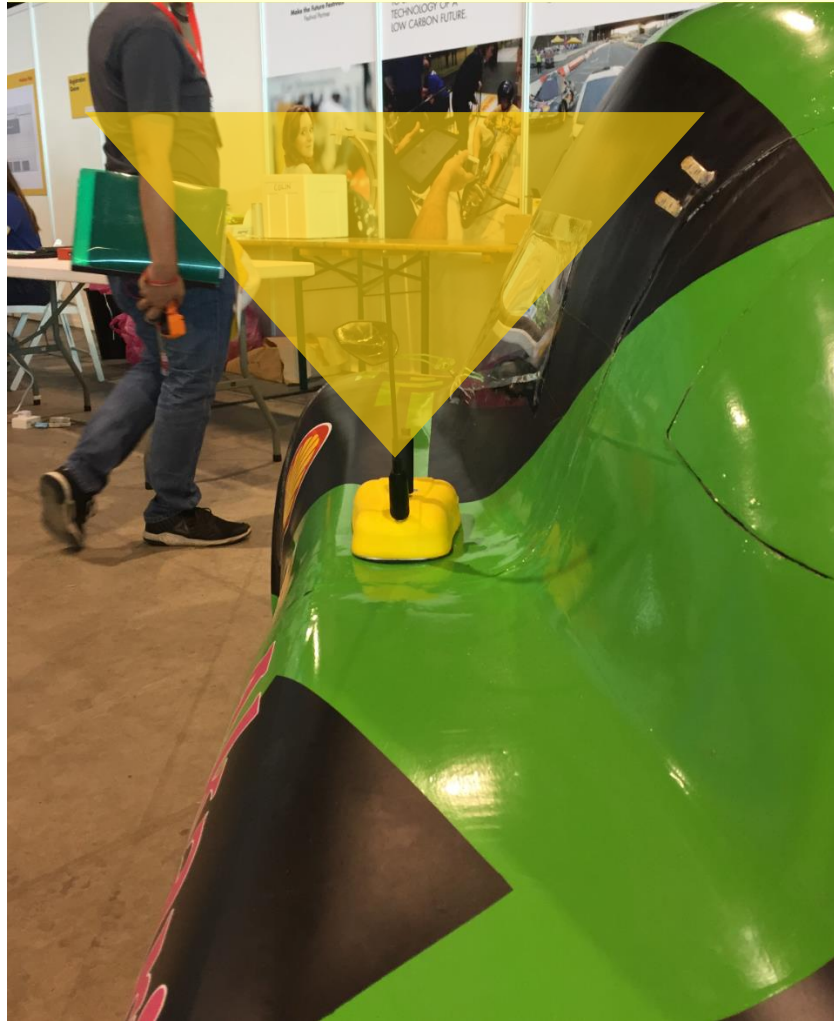
Telemetry System

Overview & Integration

1.0

Onboard-Computer (OBC) Pod mounting (on non-removable body part)







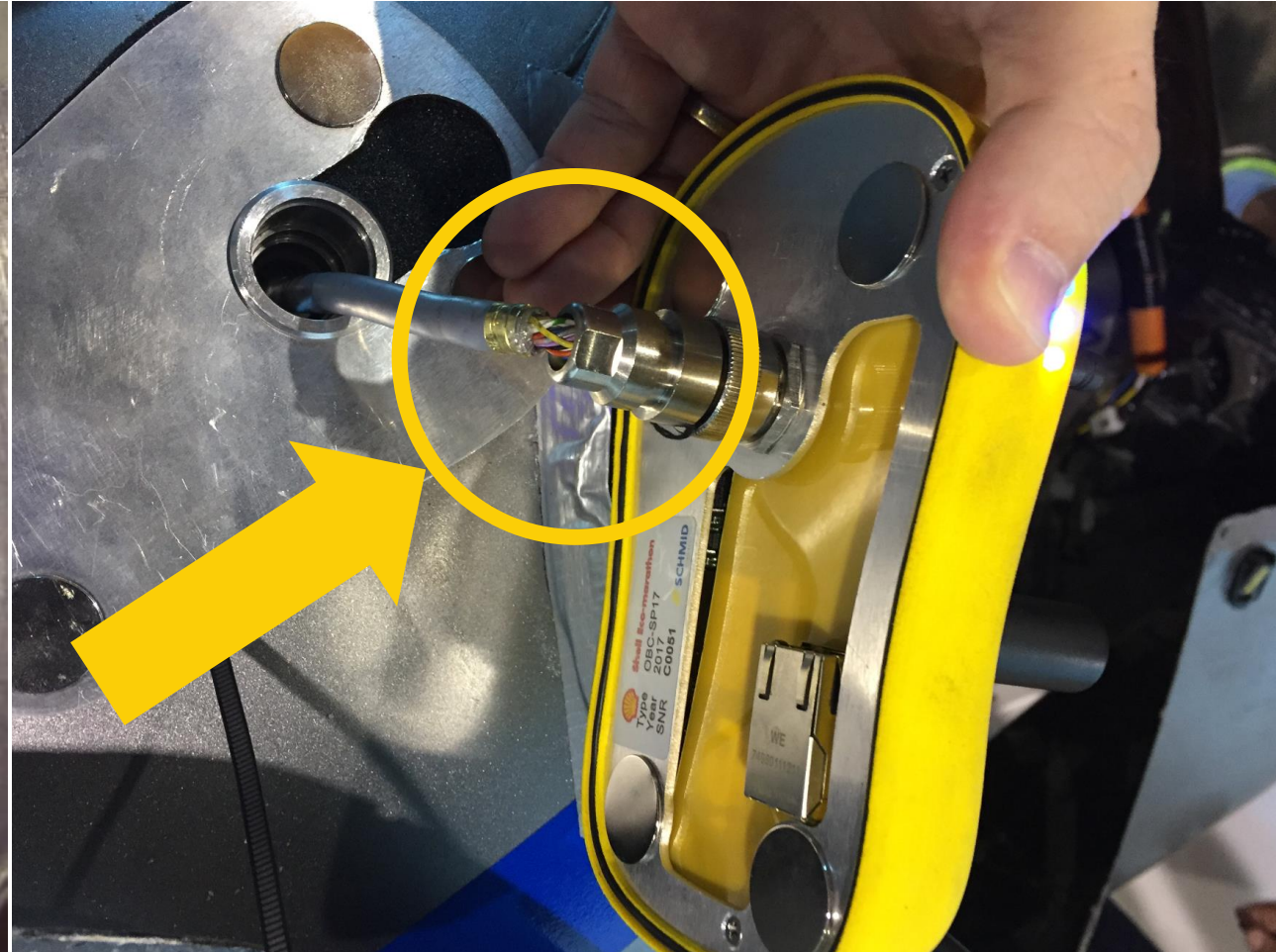
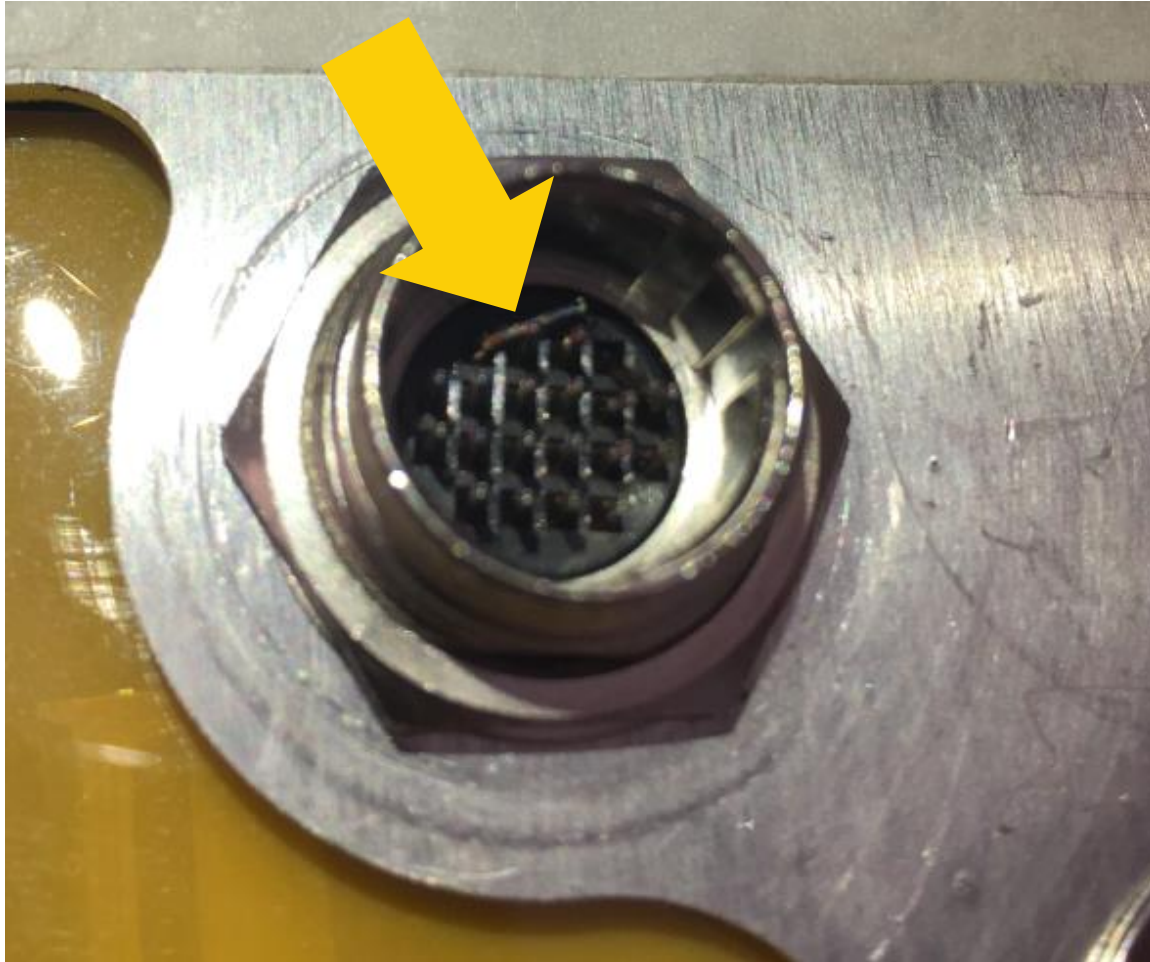
SZ+mergy

Driving Direction 

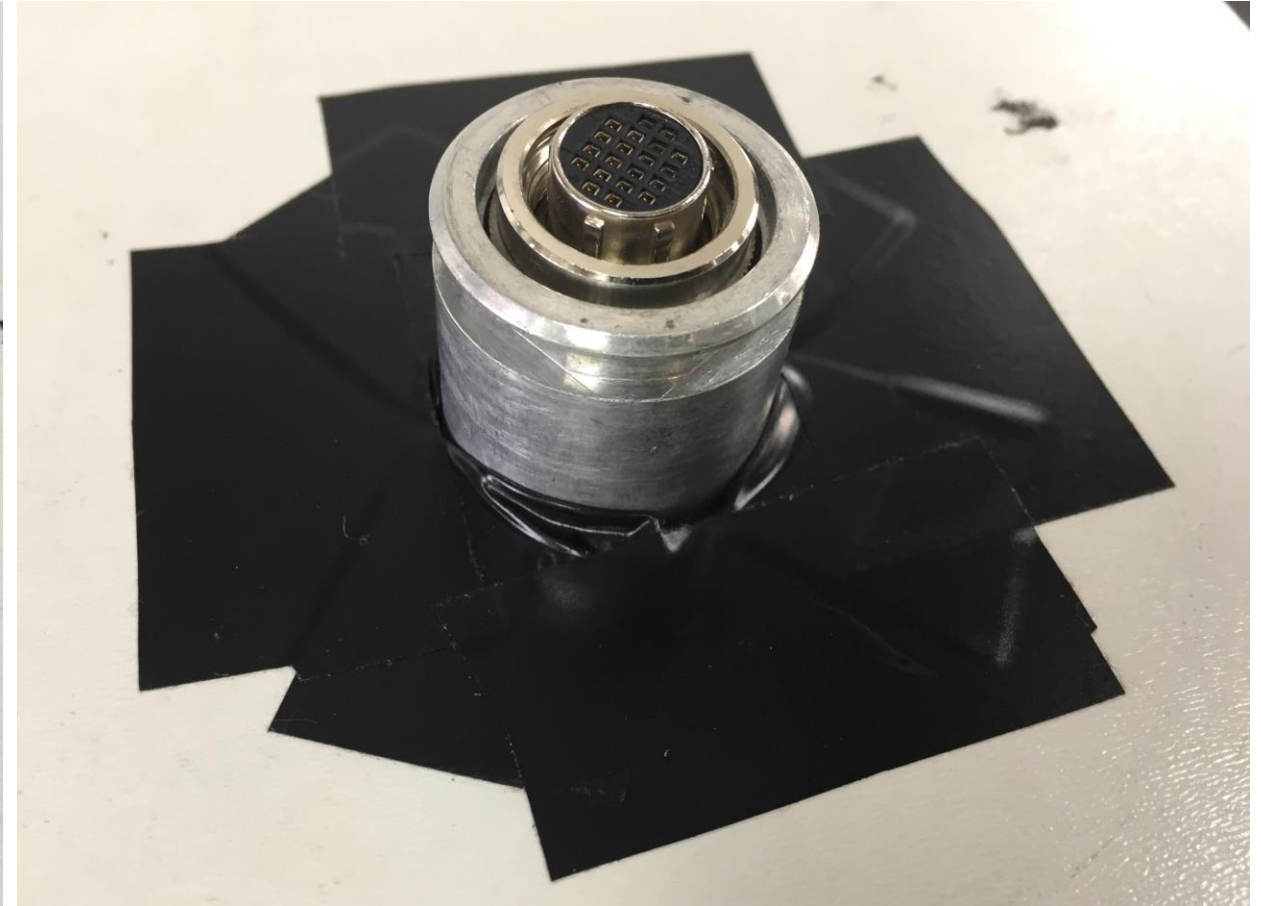
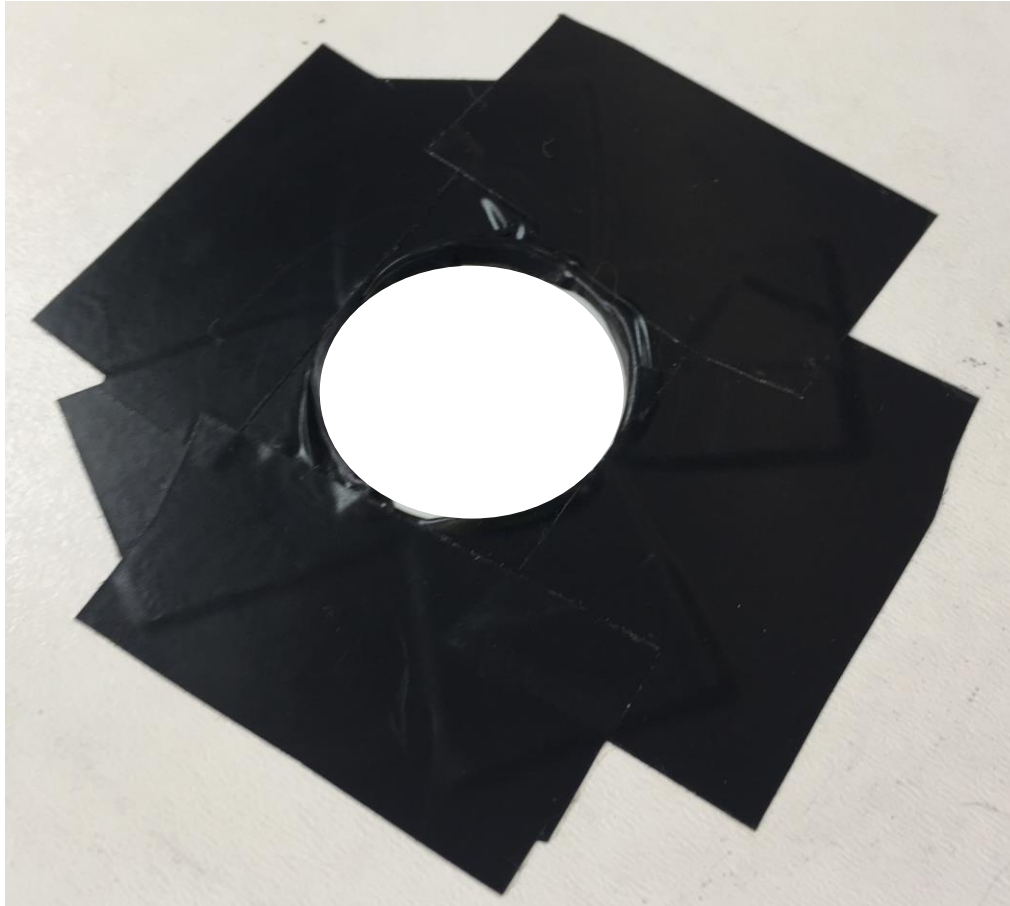


Driving Direction





POD and Backbone Mounting



No direct electrical connection to Chassis & Body

WERK
WWW.WERKPROUDS.COM
877.267.1700

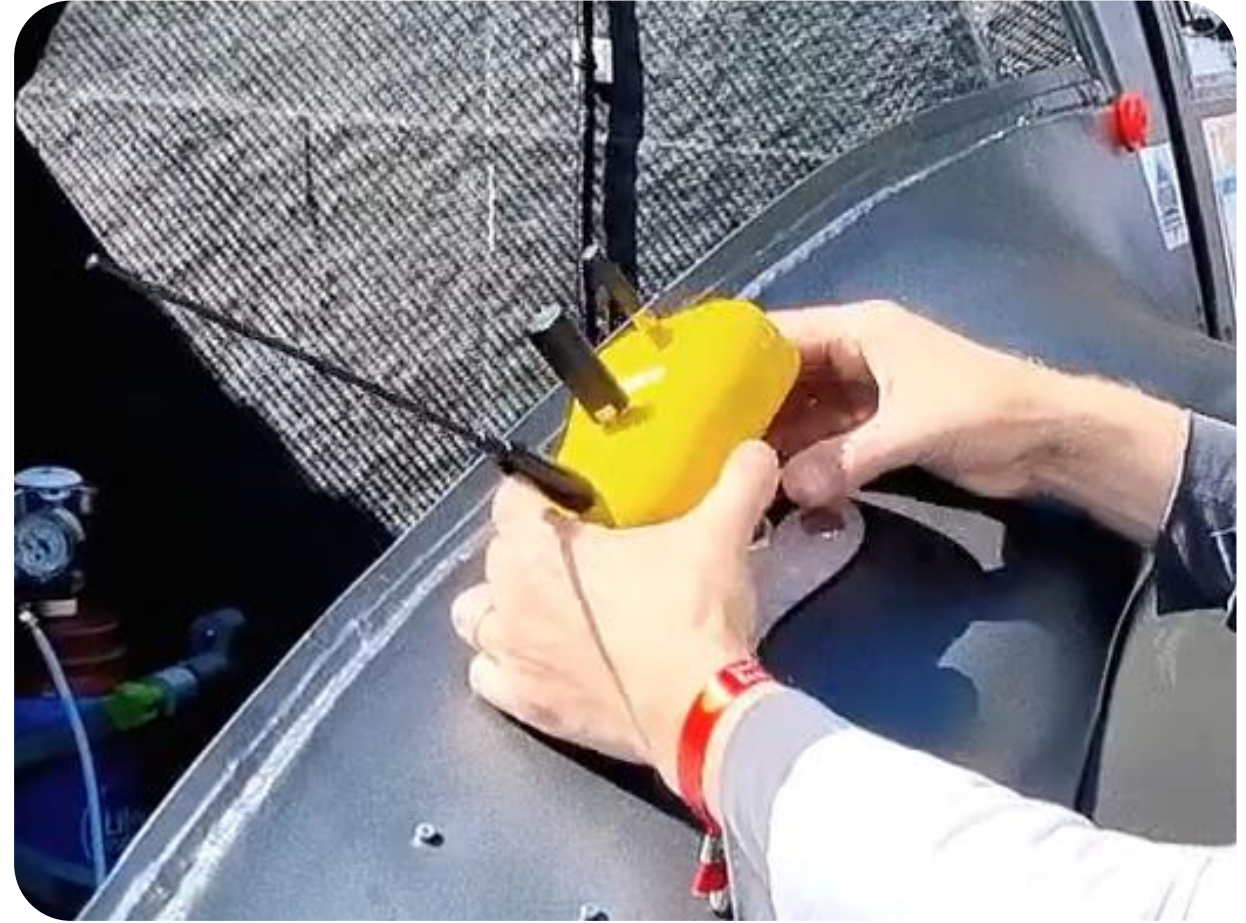
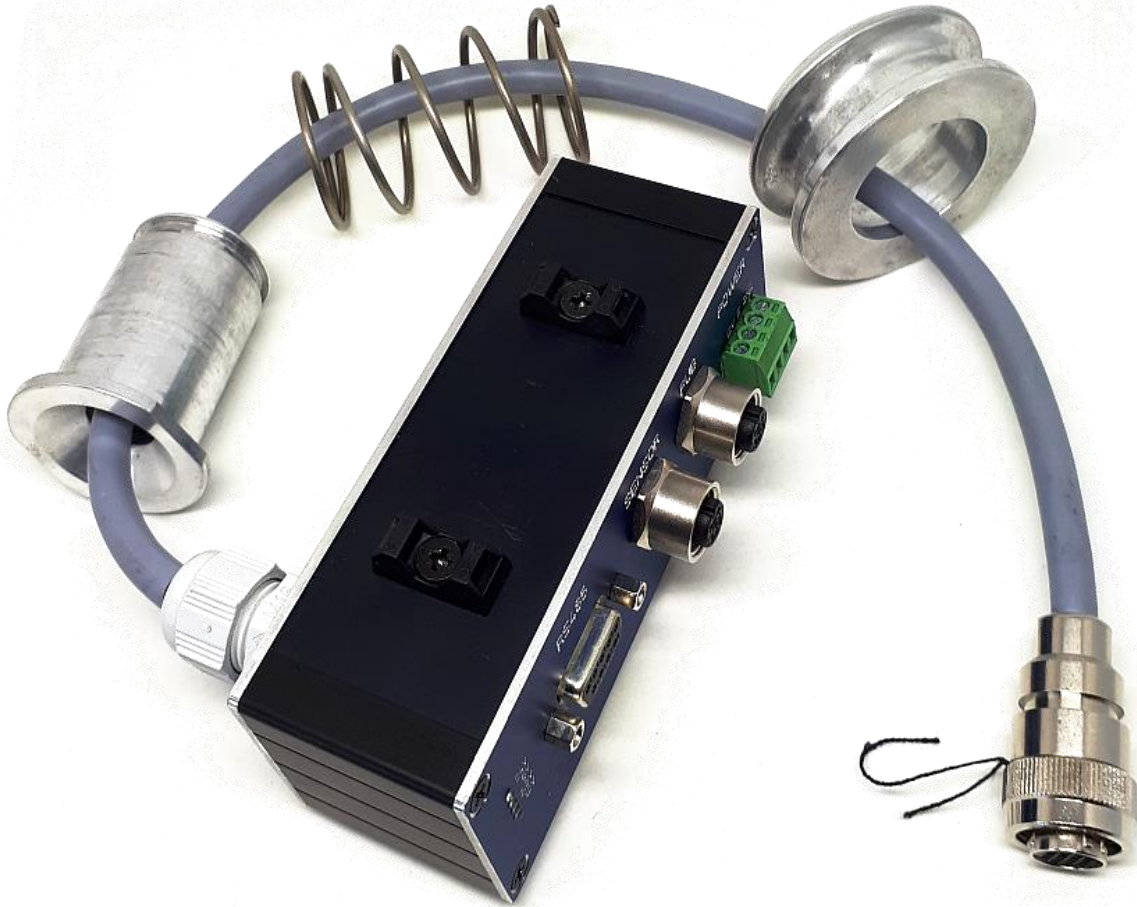


Velcro®
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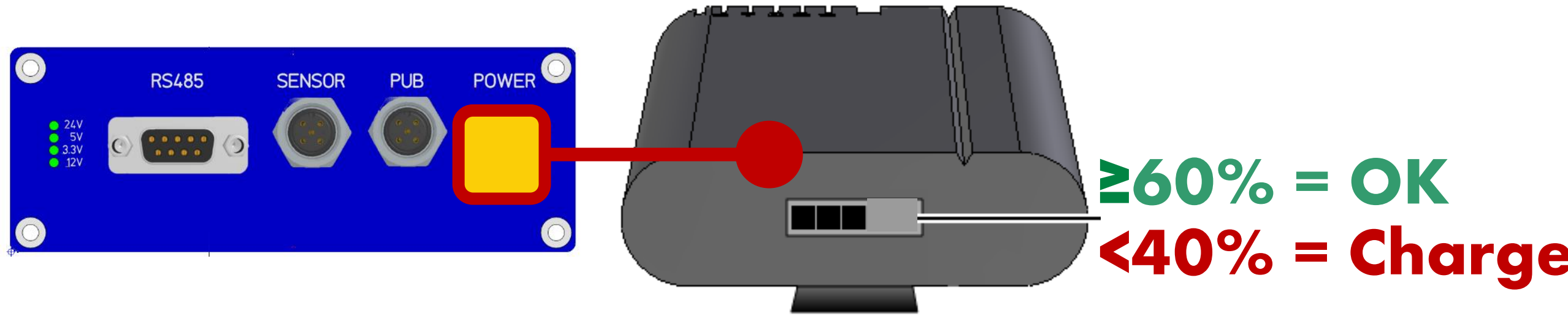


Onboard-Computer Backbone Mounting

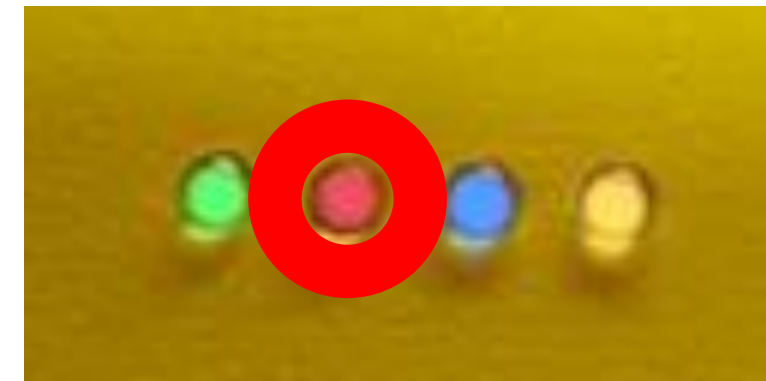


Allow for **10cm of cable lift available** (A "Fist" in between)

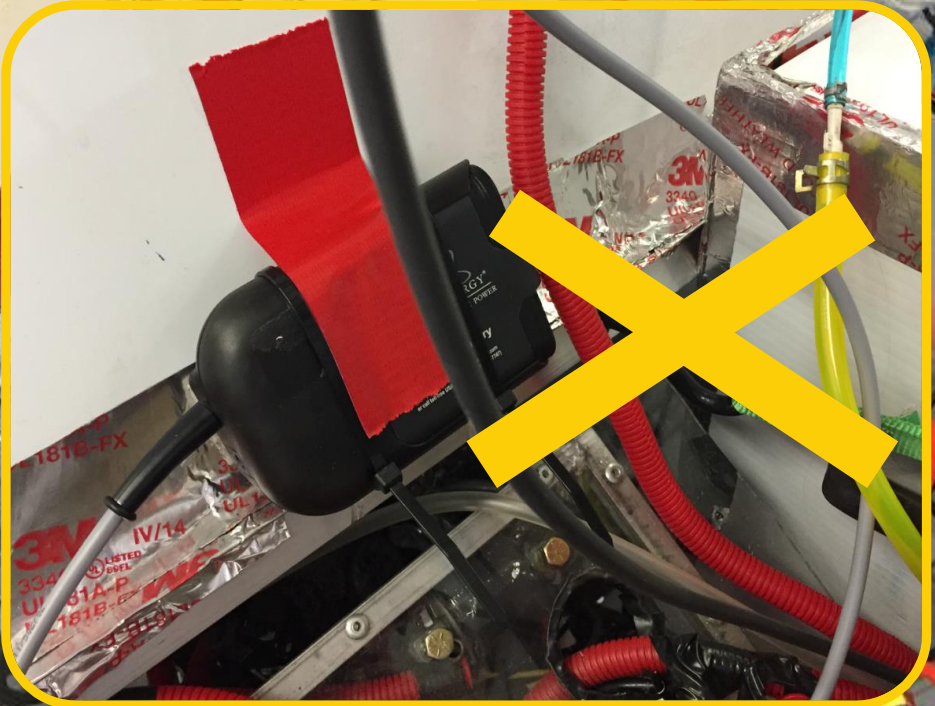
Onboard Computer **Battery**



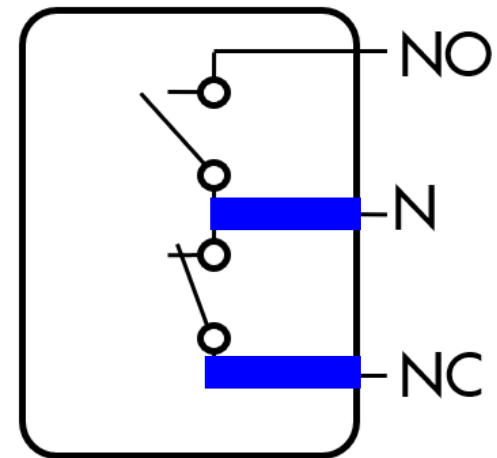
 Hint: Delayed Access To Track
if **red Light** on POD is Flashing !



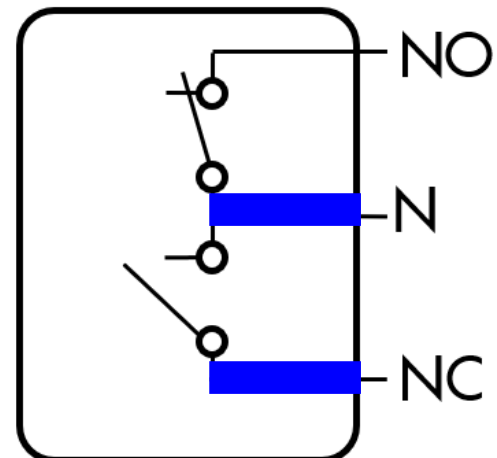
OBC Battery



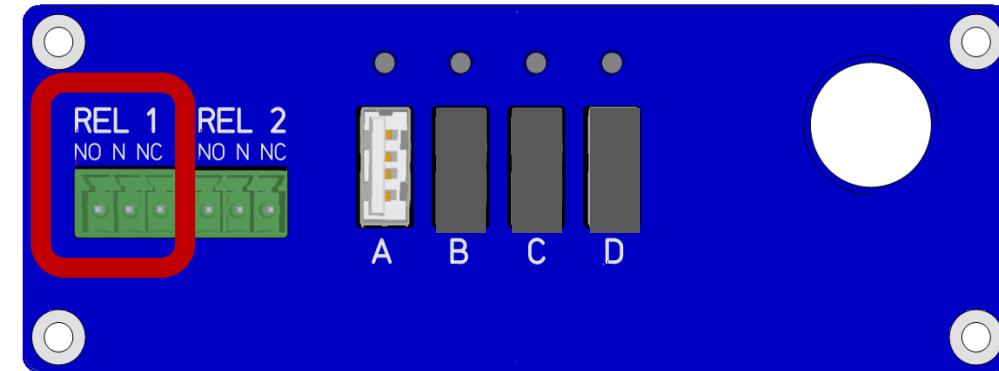
Shutdown relay, eg NC (Normally Closed), must kill the Engine when activated



Relay not activated
→ Motor ENABLED

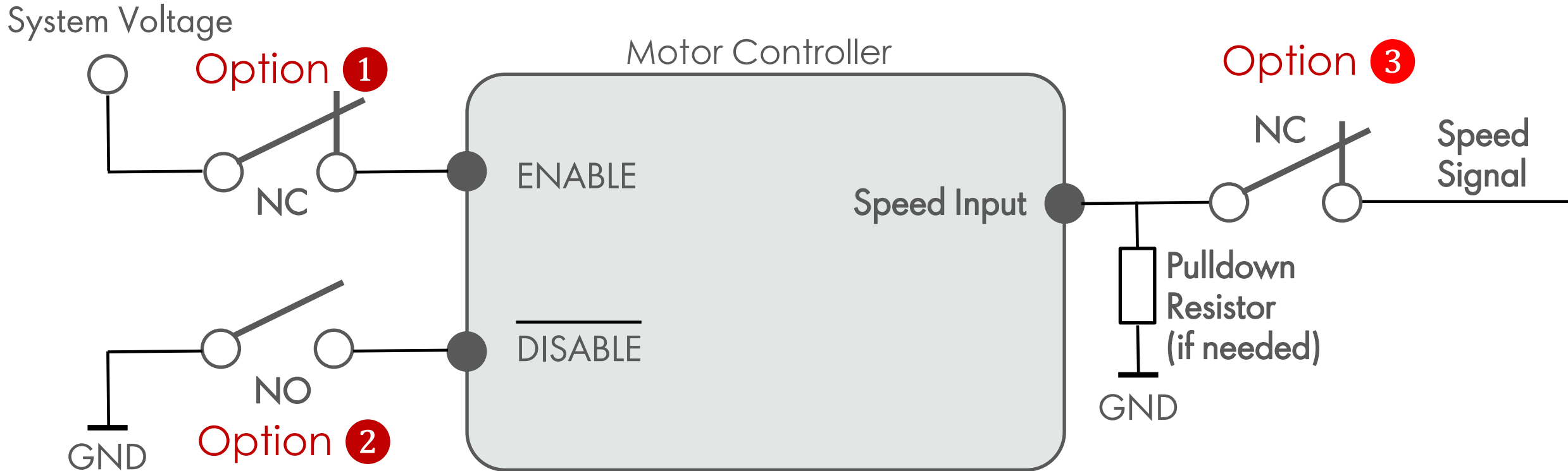


Relay activated
→ Motor DISABLED



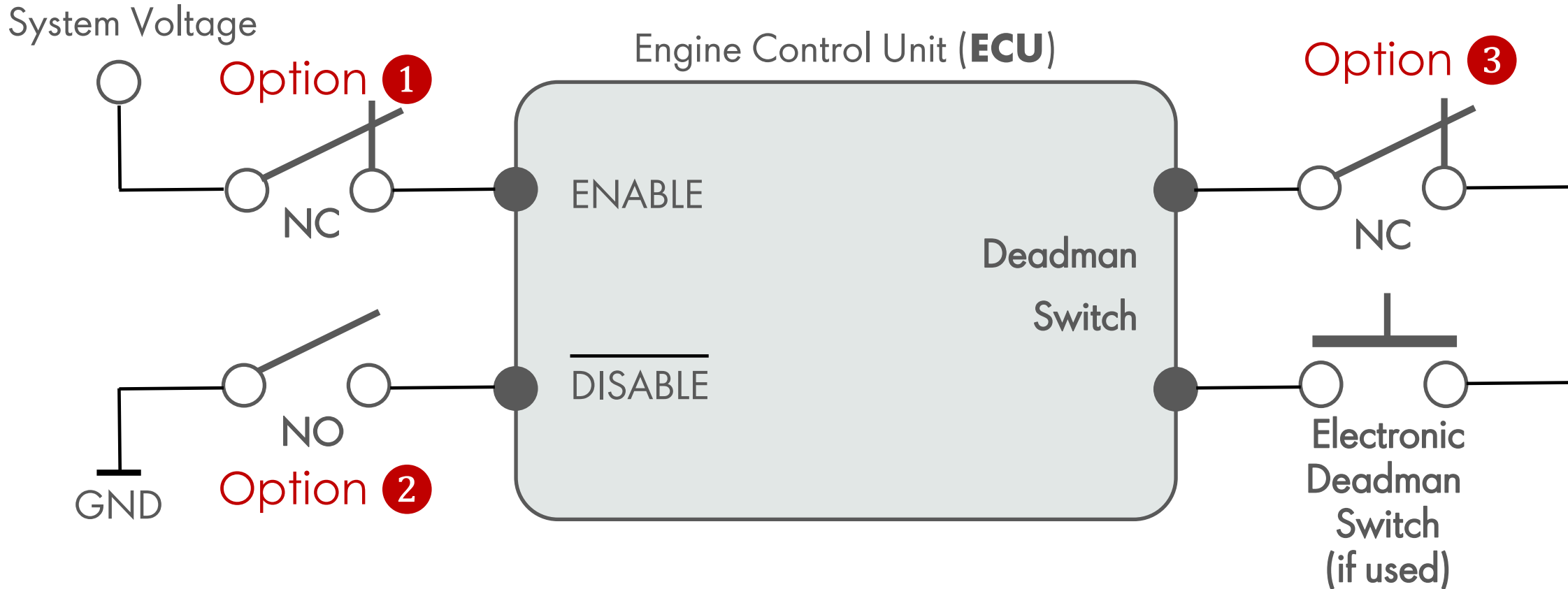
**Do not connect
the Shutdown relay
to the E-Stop!**

Shutdown Relay Example with BE/H₂



Only instrumental current allowed: max 1A

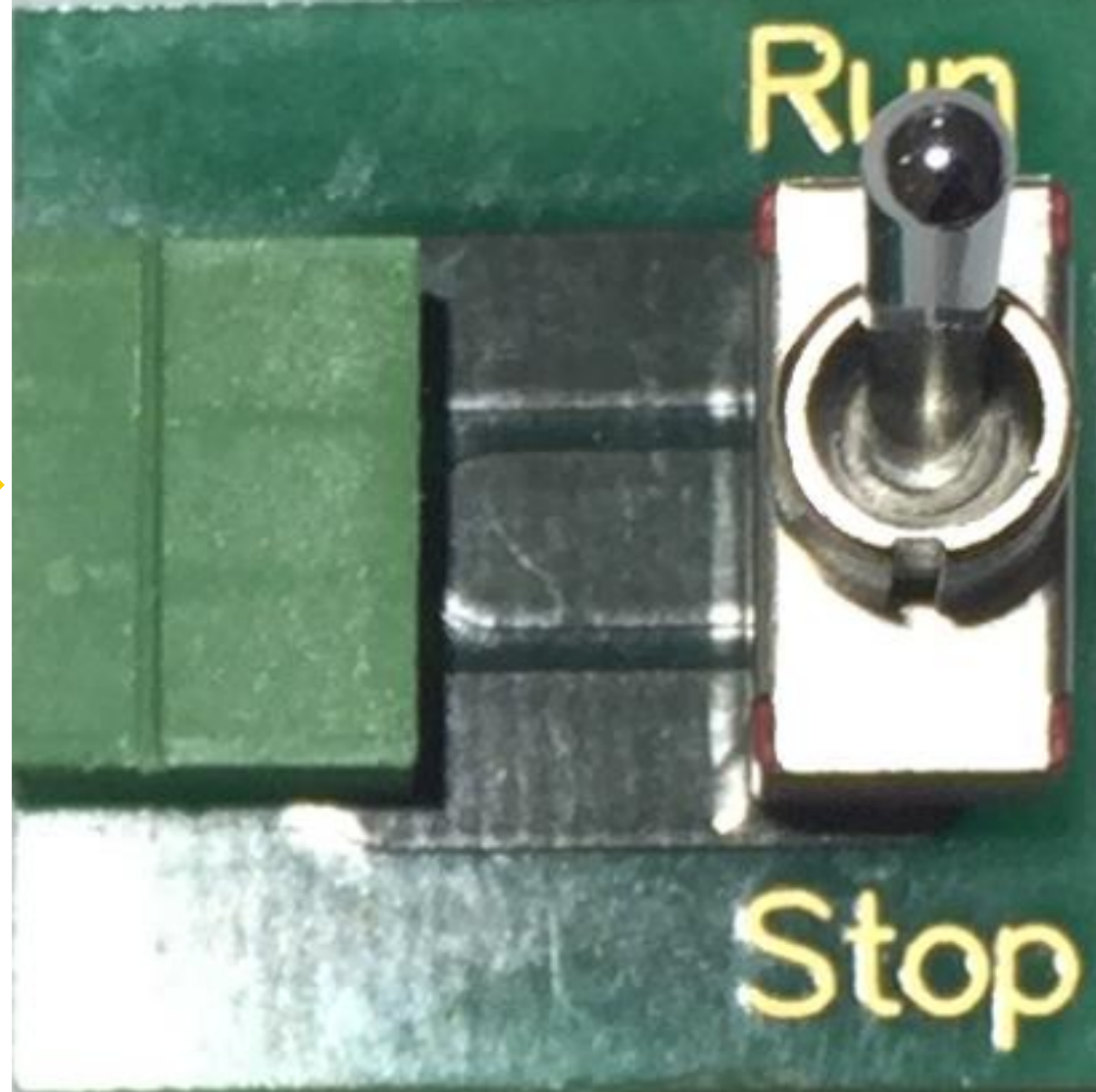
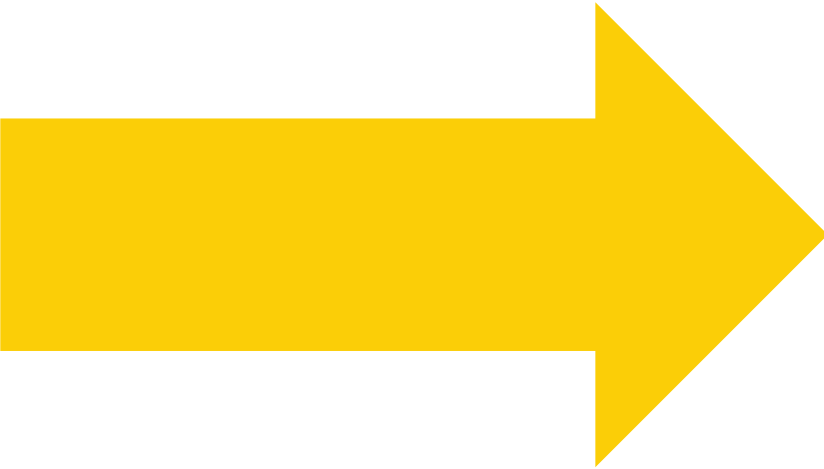
Shutdown Relay Example with ICE



Only instrumental current allowed: max 1A

Must not be connected to the ignition coil!

Relay Tester

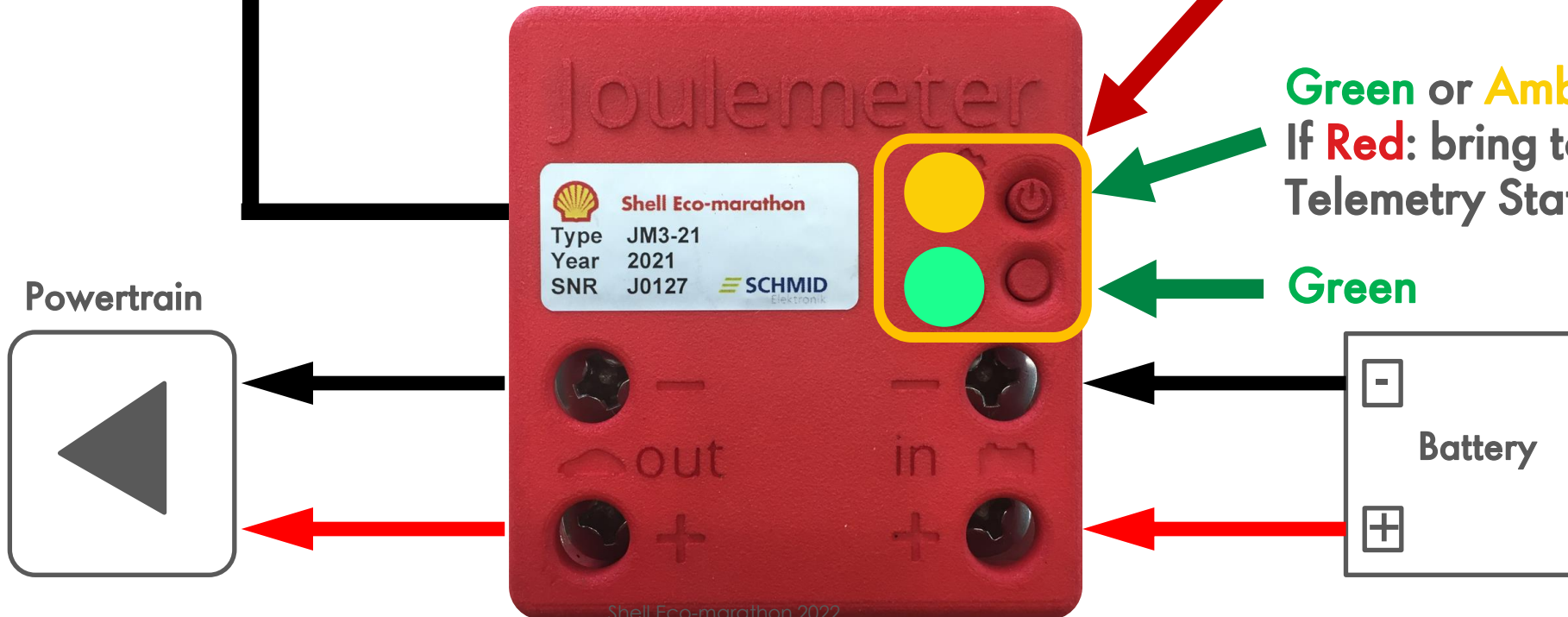
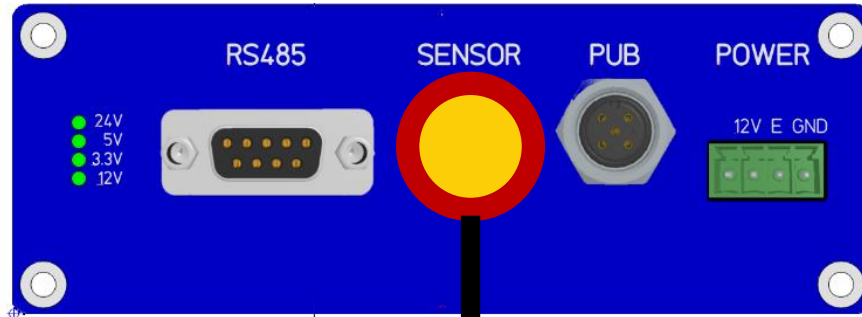


Motor Enabled

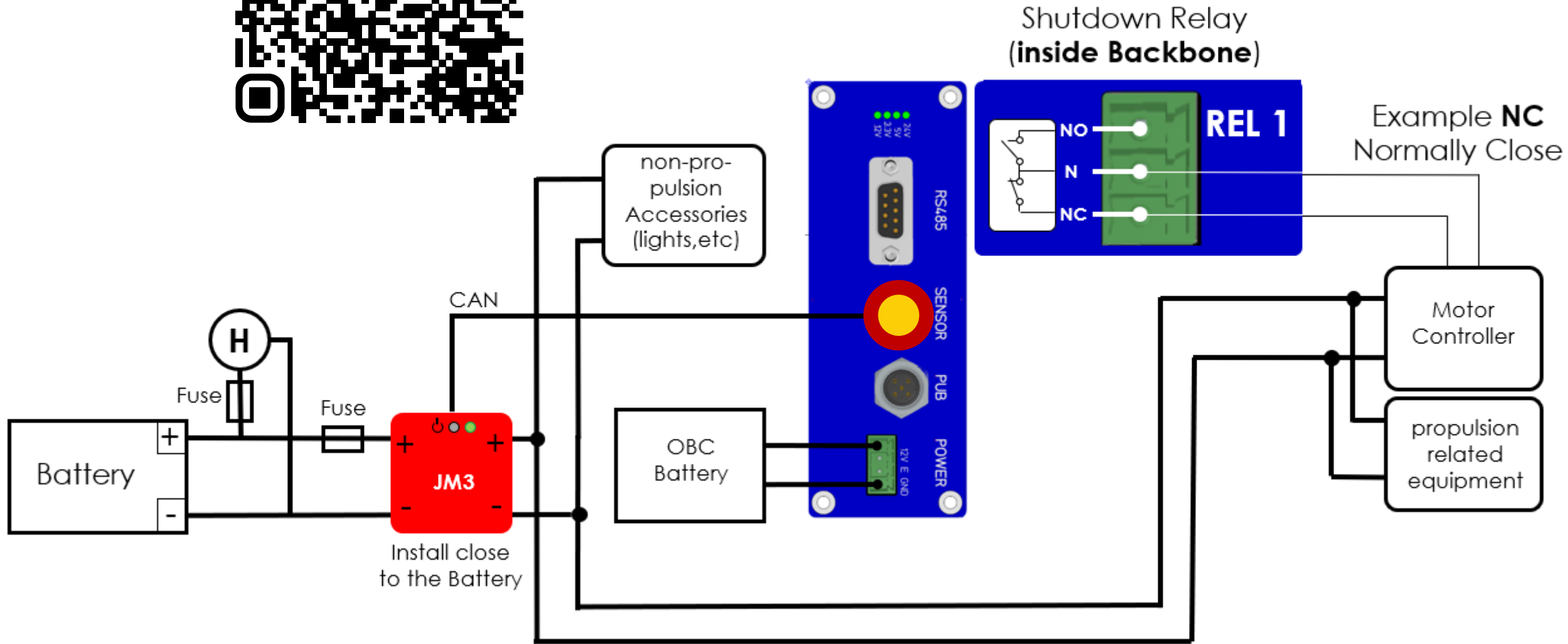
Motor Disabled

All: Joulemeter (JM3)

Buttons and LEDs must be visible and accessible

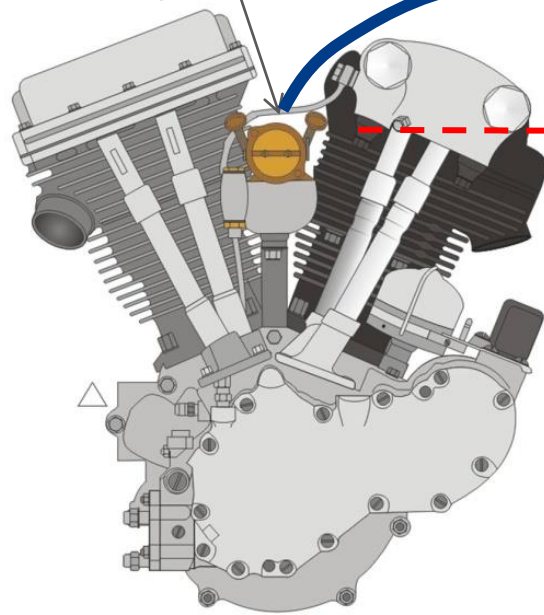


BE



ICE: Liquid Flowmeter

Fuel injector



Electrical connection
pointing up



Fuel Tank

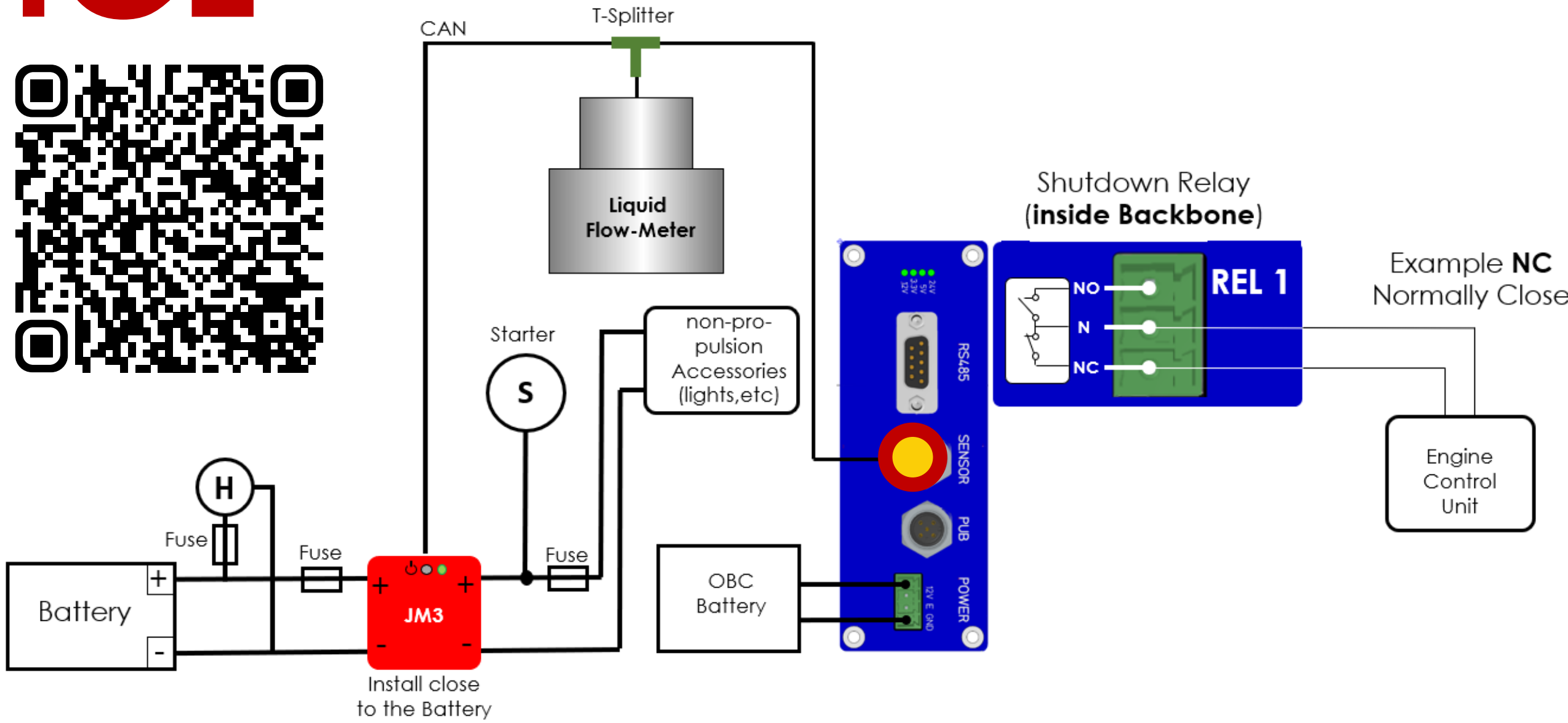


OUT

IN

LFM mounted vertically and below injector & fuel tank

ICE

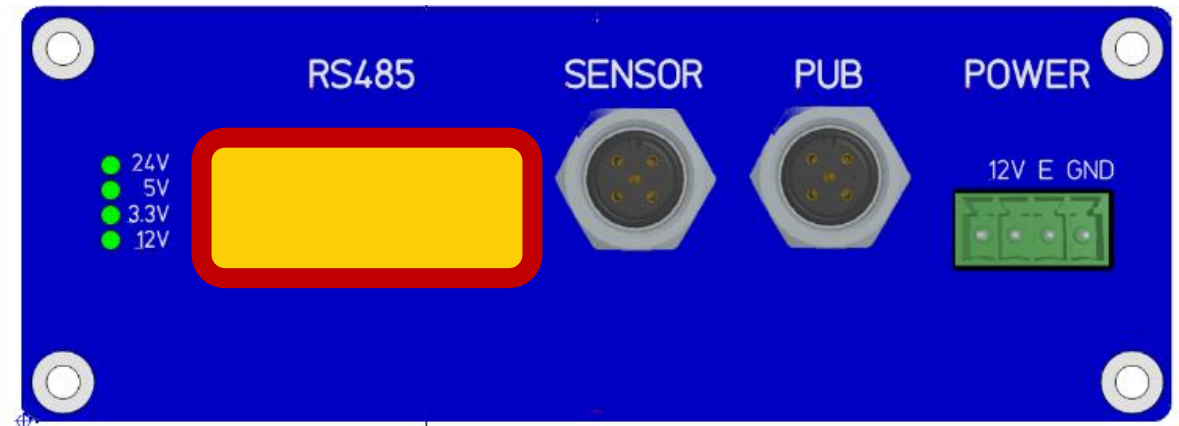


Hydrogen Gasflowmeter

- NO leaks
- NO Teflon tape
- DSUB9: Must be tight



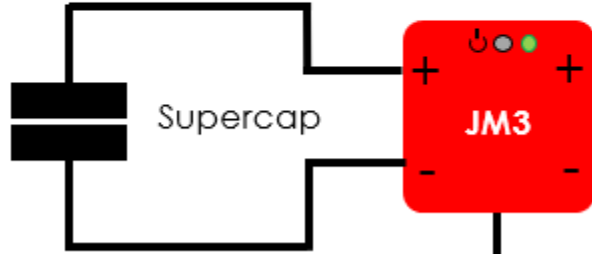
DSUB9-Cable



H2

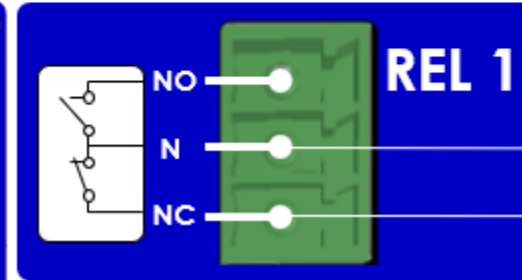


connect this JM3 even if no supercap is installed

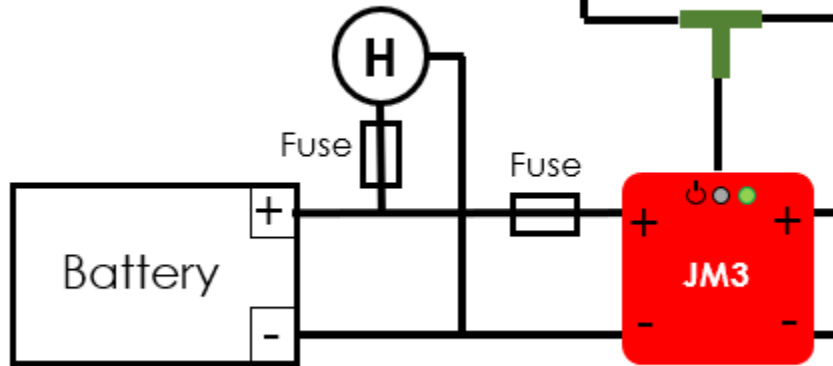


Gas Flow Meter

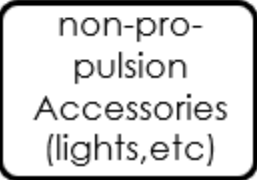
Shutdown Relay (inside Backbone)



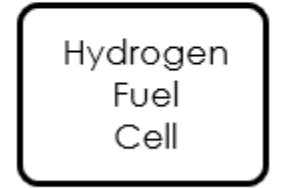
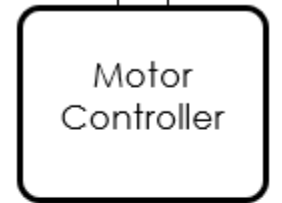
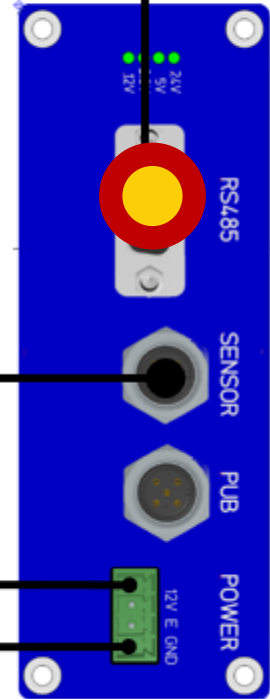
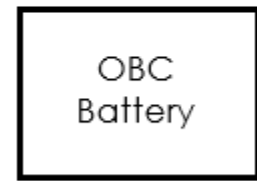
Example NC Normally Close



Install close to the Battery



CAN

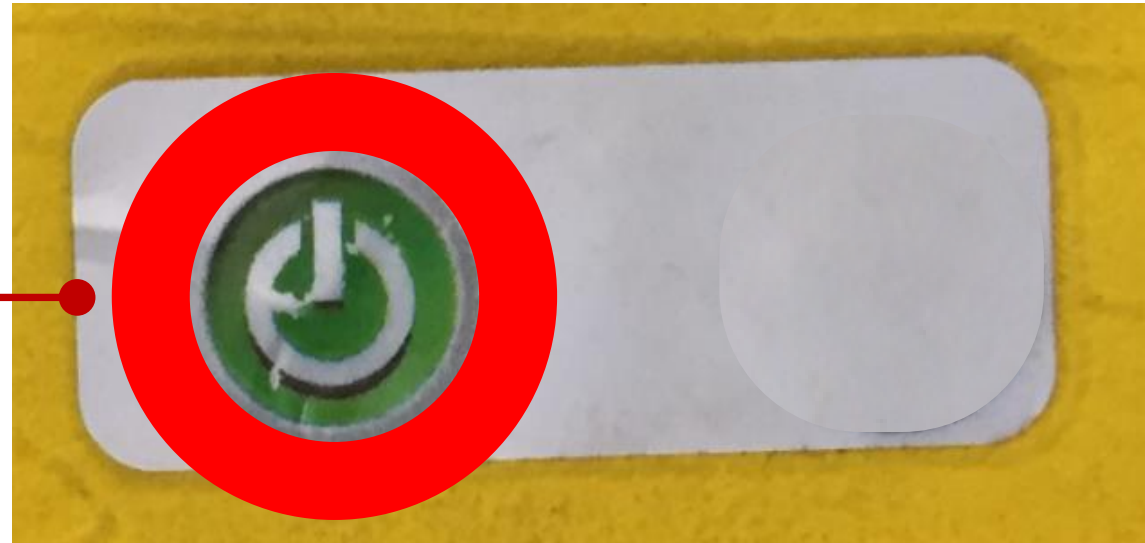


Telemetry System Selfcheck & Guidelines

2.0

Quick Self-Check before inspection

- Check **OBC battery 60%**
- Switch **on** OBC
- Wait max **60** seconds



Very Important for best EMI Compatibility

No direct electrical connection of

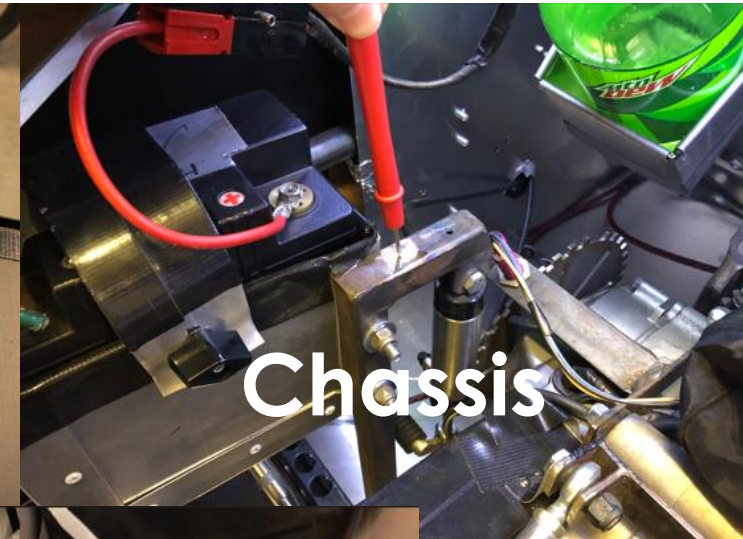
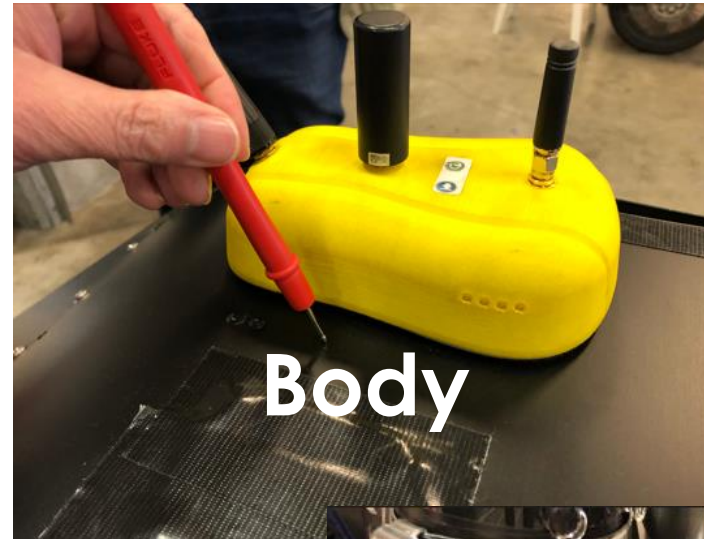
Onboard-Computer to

Vehicle Chassis and Body

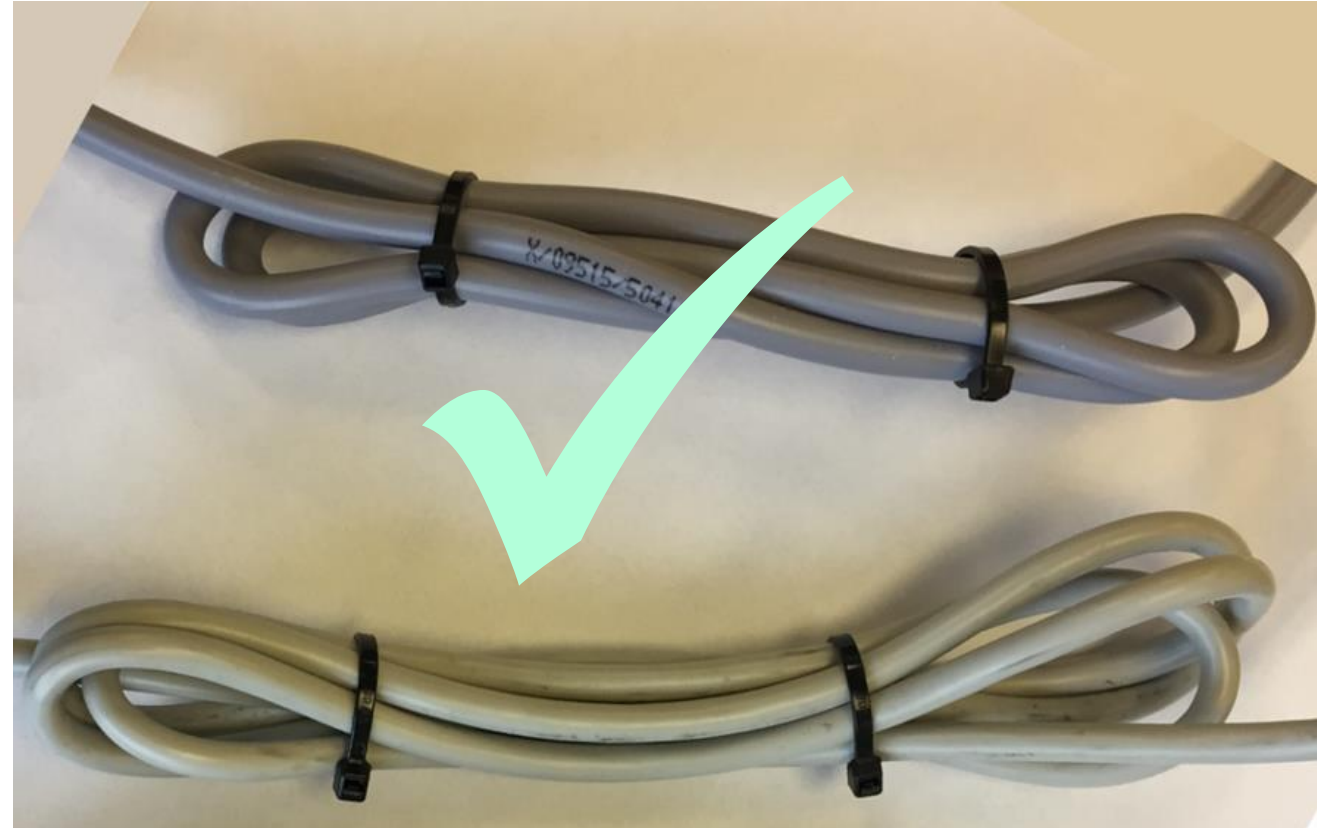
Stay away from Electromagnetic Fields

Verify the electrical Connection

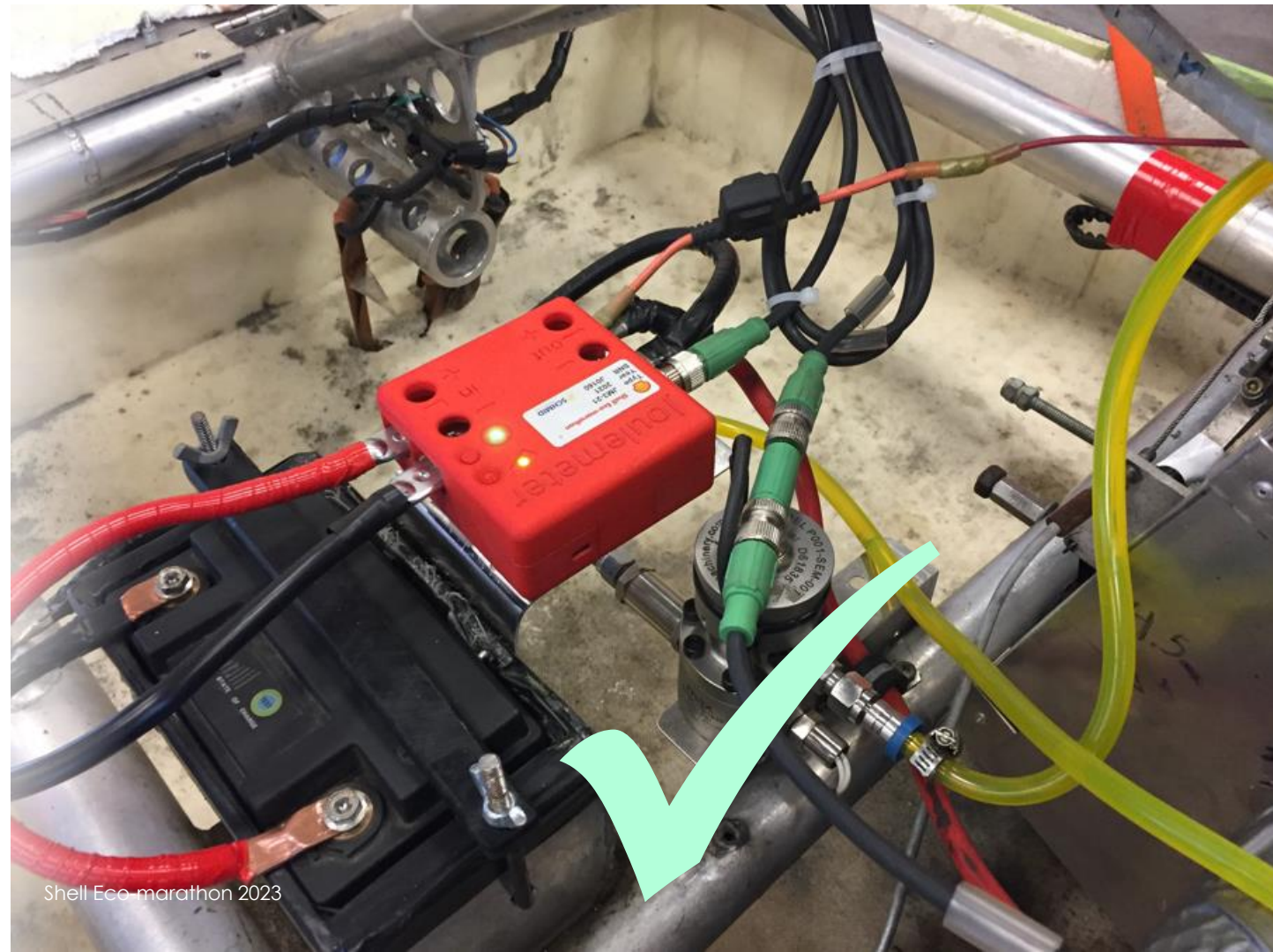
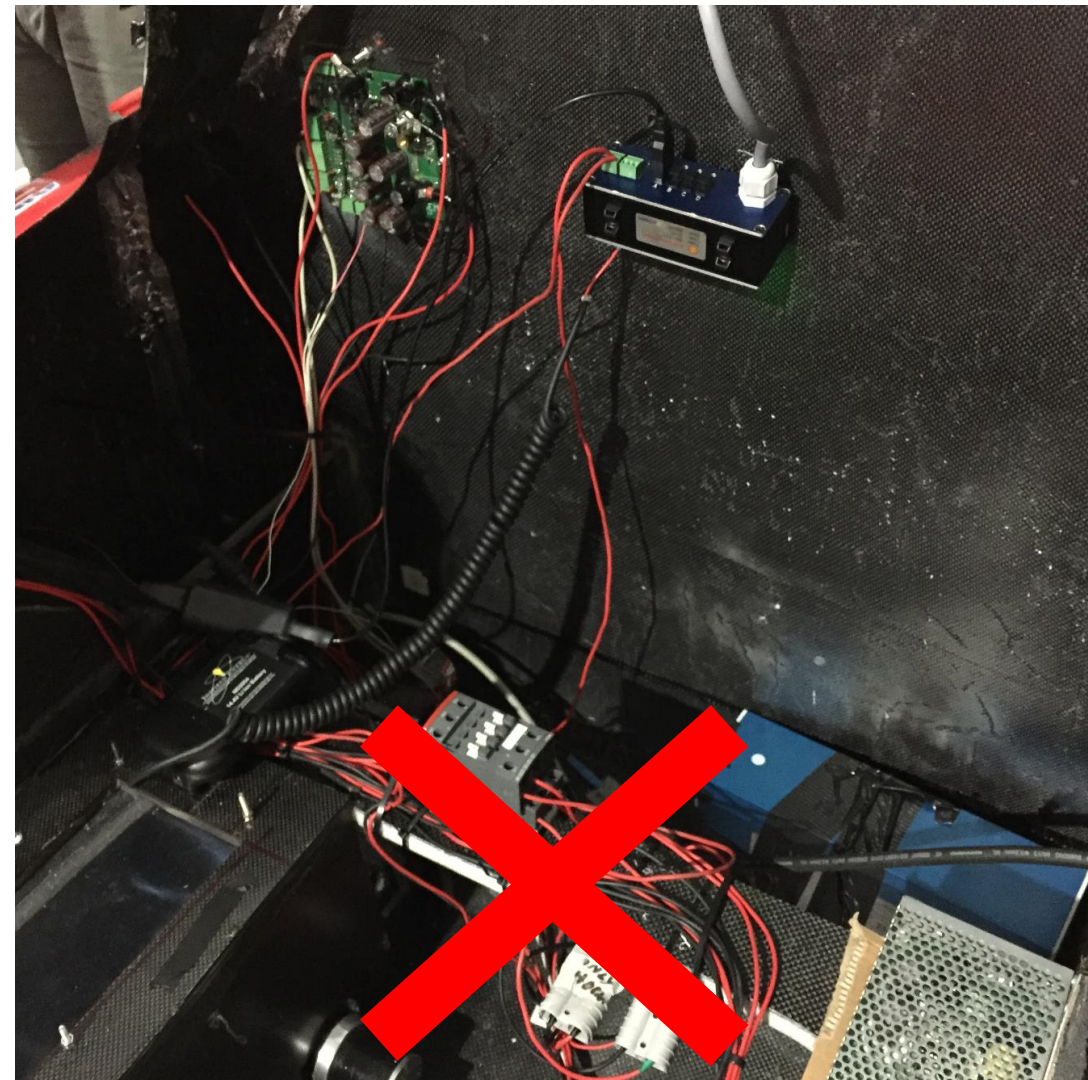
<100 k Ω



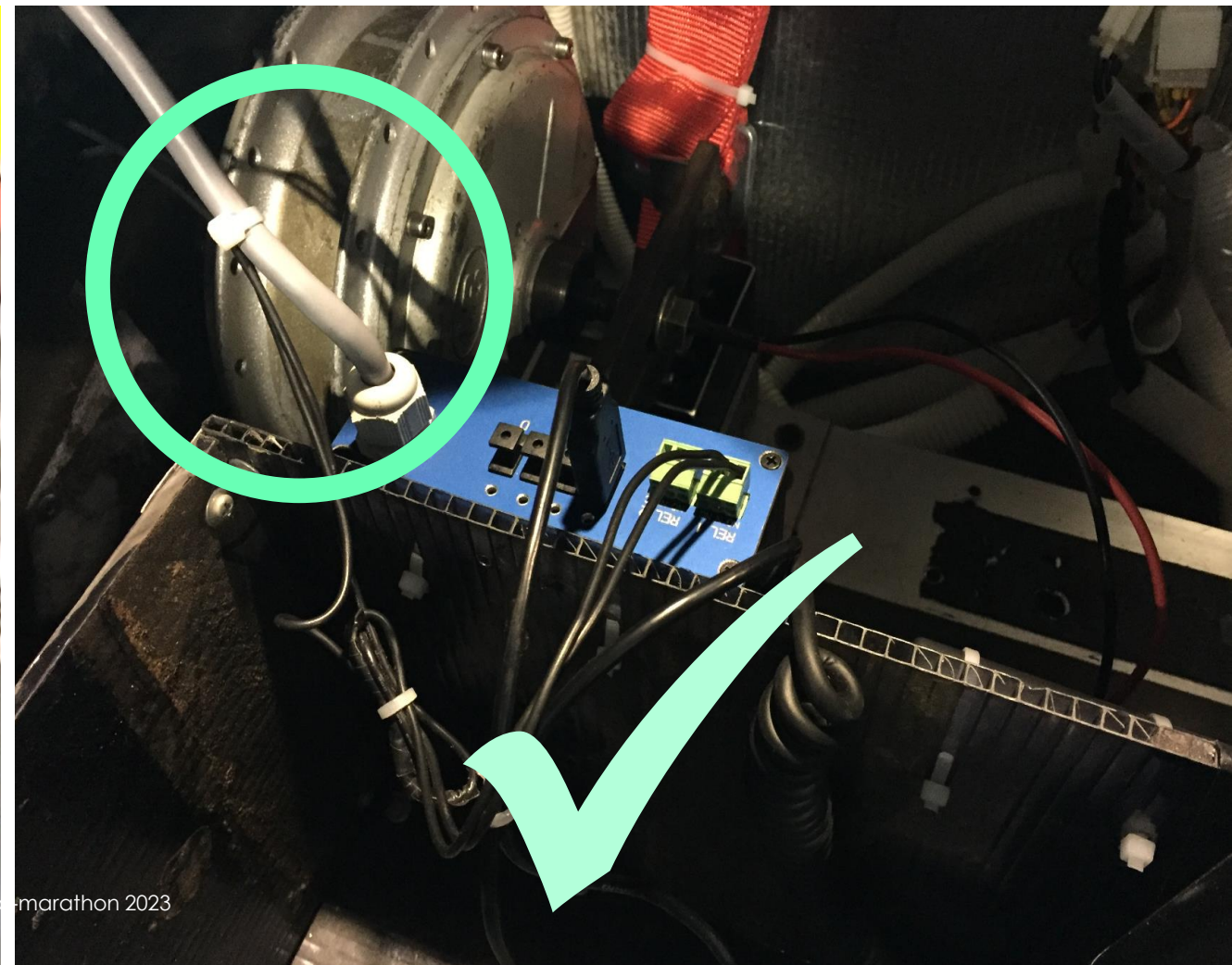
Guideline ① No wide Loops in Cables



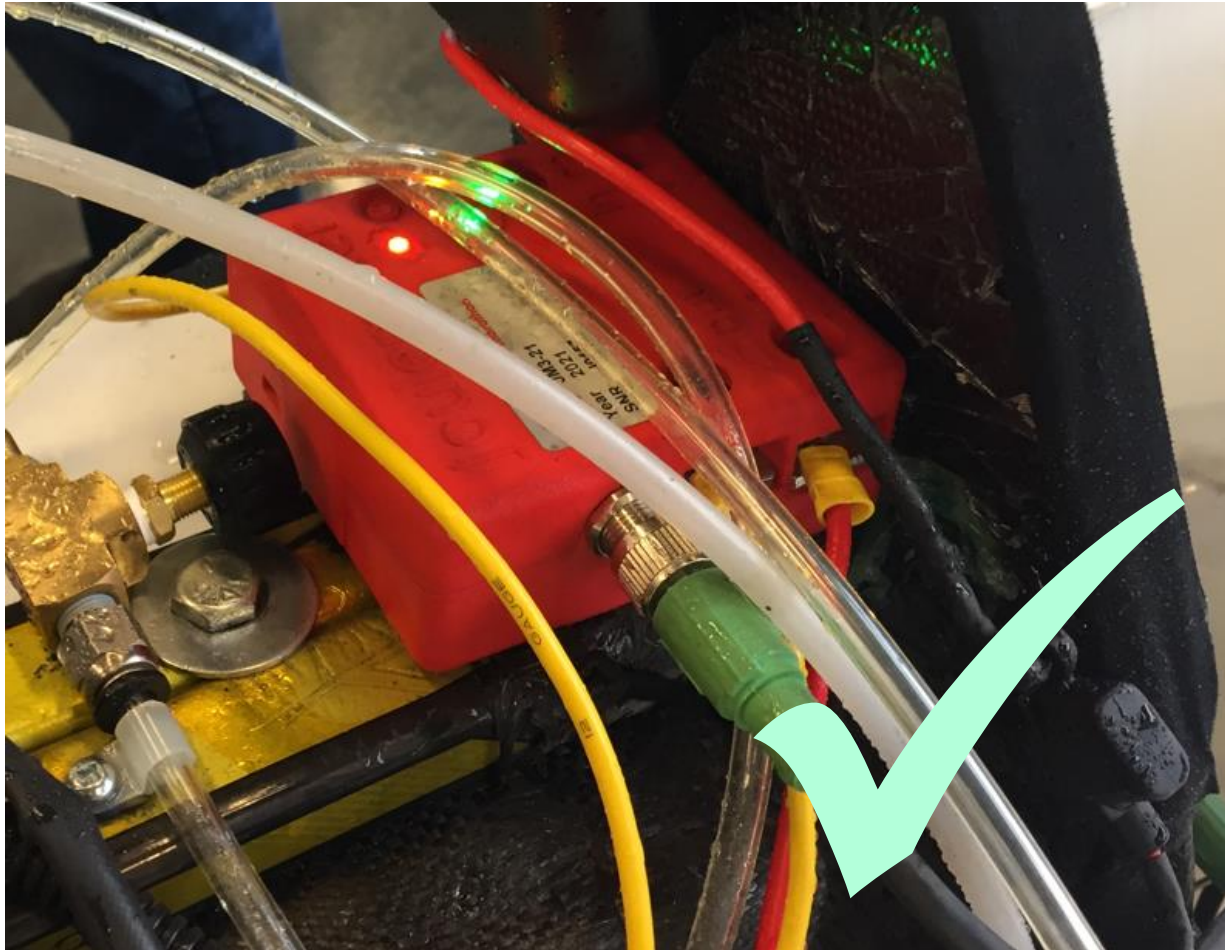
Guideline ② Cables mounted securely

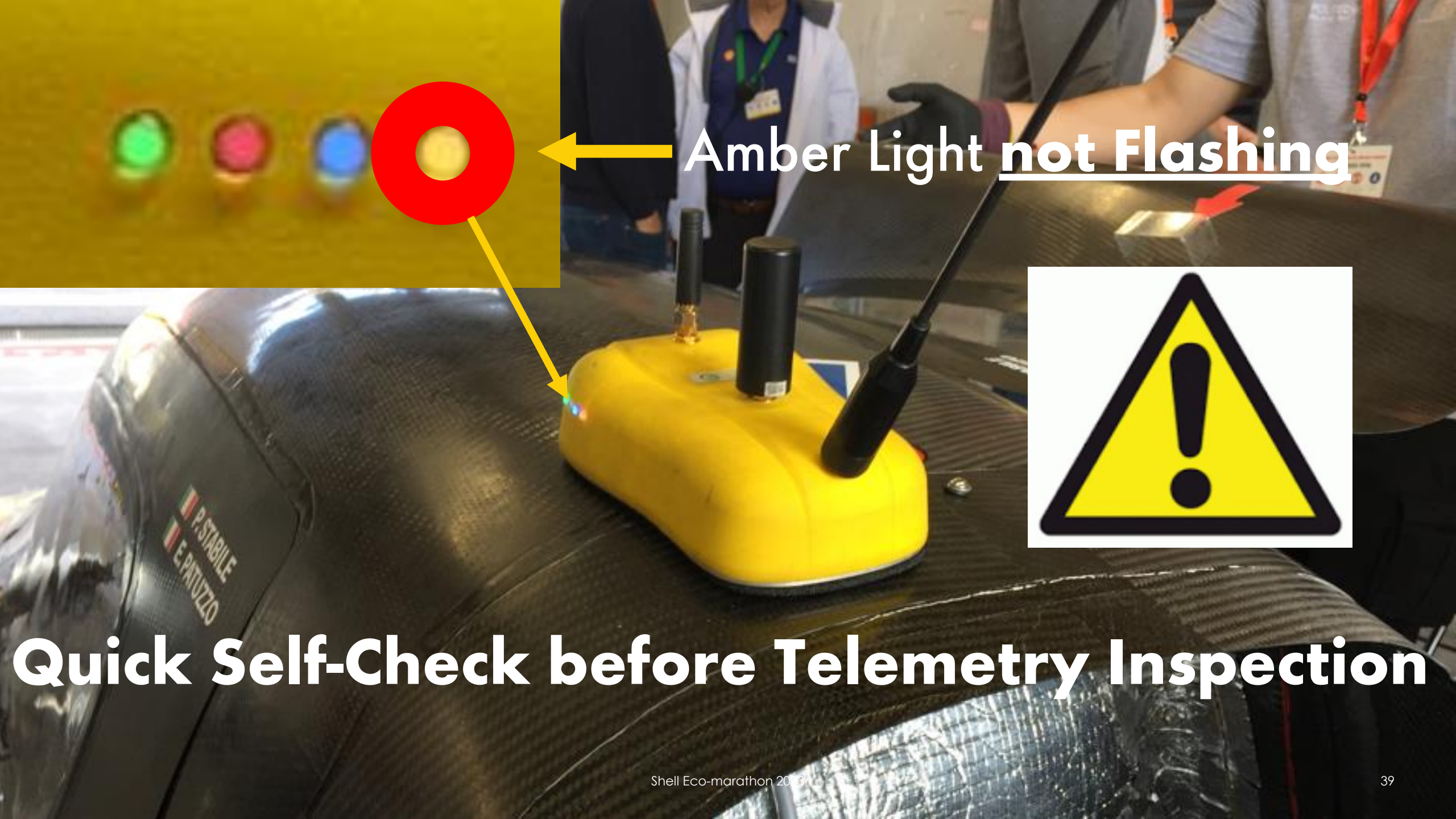


Guideline ③ Strain Relieves Applied



Guideline ④ Connectors fastened “Click”





Amber Light not Flashing



Quick Self-Check before Telemetry Inspection

DO NOT COME TO **TELEMETRY INSPECTION** UNTIL:

- ✓ **OBC-Pod** mounted correctly
 - ✓ OBC Pod unobstructed field of view of 90° to all sides
 - ✓ OBC Pod < 20° off horizon (pitch & roll)
 - ✓ OBC Pod in driving direction
 - ✓ OBC Pod 10cm of cable lift available (a fist)
- ✓ **OBC Backbone** mounted correctly
- ✓ **Battery** mounted correctly
 - ✓ removable to the side or up, no tapes
 - ✓ > 60% of charge
- ✓ **Sensors** mounted correctly
 - ✓ JM3 LED-check (Status: **Green**, Battery: **Amber/Green**)
 - ✓ JM3 Buttons accessible, LEDs visible
- ✓ **Cables** mounted correctly
 - ✓ No wide loops in cables
 - ✓ Cables mounted securely
 - ✓ Strain reliefs applied
 - ✓ Connectors fastened (check the «click» at the end)
- ✓ **No direct** electrical connection of OBC to car body or chassis
- ✓ **OBC** working properly
 - ☐ LEDs after 1min = **Green** Off **Blue** **Yellow** ● ○ ● ●
- ✓ **Shutdown Relay** working properly
 - ✓ Start engine (if not yet running)
 - ✓ Simulate relay with supplied electronic switch
 - ✓ Engine stops

Amber Light is Steady



Team	Date	Name	Signature
714	20.5.2023	John Smith	<i>J. Smith</i>

Inspector

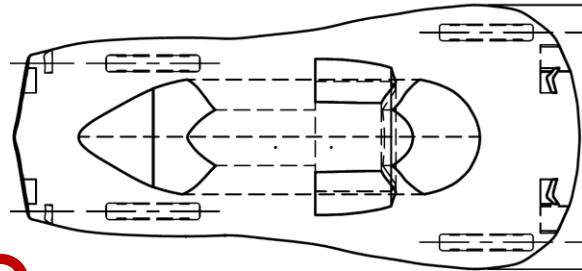
Telemetry System

Race Processes

3.0

IMPORTANT for Practise Runs & Attempts

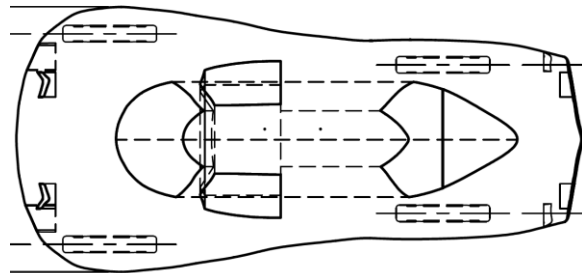
Battery $\geq 60\%$
Switch OBC **ON**
Switch JM3 **ON**
Steady Amber LED



**Start
Area**

Outside Track: OBC and JM3 switched **OFF**

Switch OBC **OFF**
Switch JM3 **OFF**



**Finish
Area**



Quick Assessment

**The Most Important
Rules & Guidelines?**



Telemetry Kit

1. Check your **Telemetry Ticket**
2. Complete the **Self-Inspection Checklist**



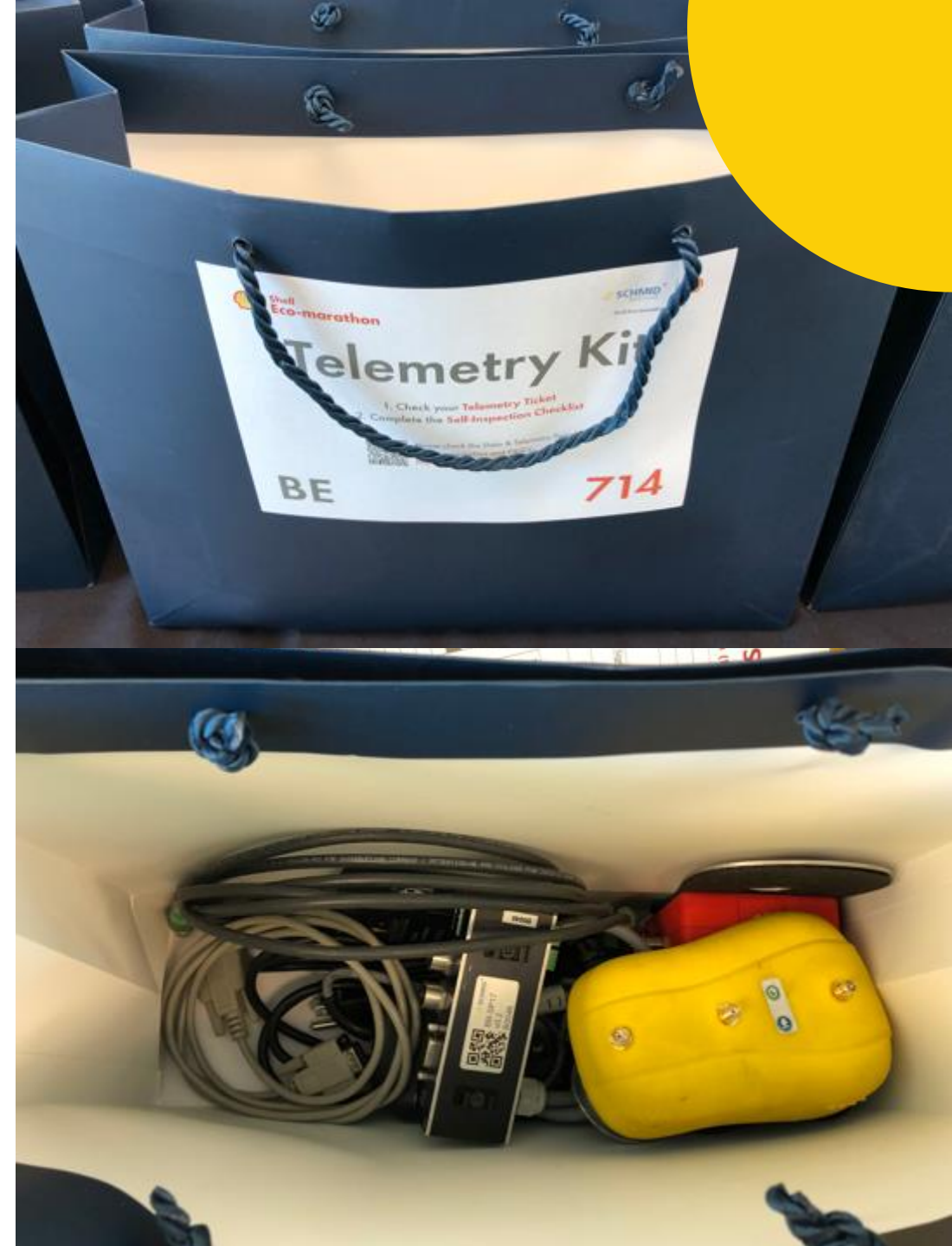
Please check the Data & Telemetry Portal
for documentation and FAQ's:
<https://telemetry.sem-app.com/>

BE

714



Get your
TELEMETRY KIT
at the
Telemetry Station



THANK YOU



Good Luck on the Track!
See you at Tech with a Steady Light