G Force Control Box V1

PCB V1.0
Firmware V1.3
Manual V1.0

1.Warning

The harness tensioner is a piece of equipment that requires meticulous handling due to its potential to cause injuries or material damage through mechanical or electrical shock. Before any use, it is crucial to ensure that users fully understand its operation.

To minimize associated risks, strict safety protocols must be observed. The device will **only be operational when it is in active mode and connected to Simhub.**

It is essential to verify that all components are correctly installed and configured before putting the device into service. Each component has been designed to operate within the defined power specifications. Using cables that do not meet specifications will void the product warranty.

2.Content

1) Control Box
2) Control panel with cable
3) USB-C cable
4) 220V power cable
5) Control panel mounting brackets

3. Connections

The control box manages the power supply to the driver via a relay: the power connector must be connected to the 220V mains using the provided cable. An EMI filter is integrated into the control box.
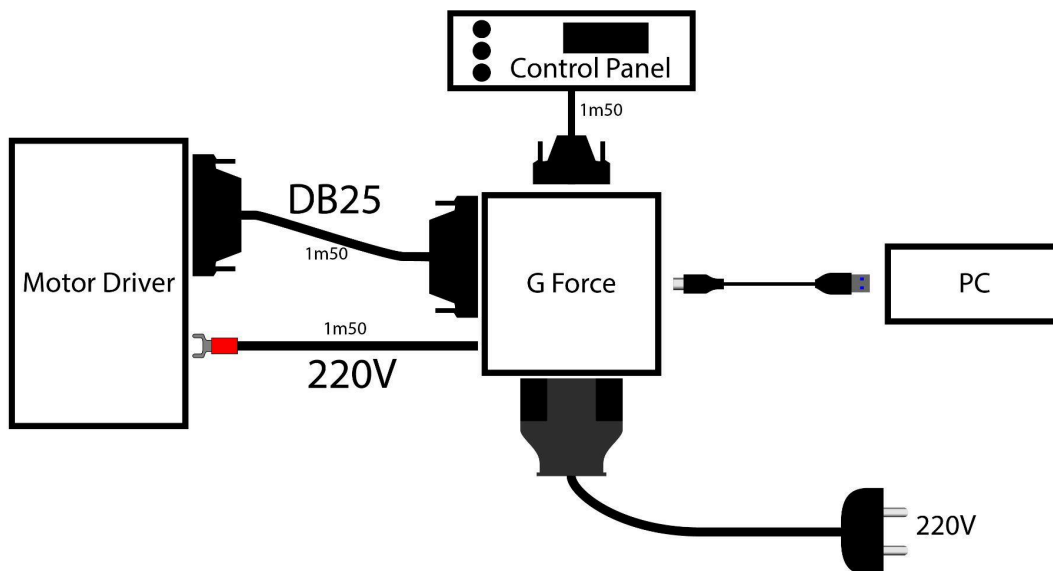
The control box allows managing two motors, to handle lateral G's. It is both transparent and optional: if you have only one motor, you can use any DB25 port.
Do not use the USB hub for connections.

3.Driver Settings

All the following settings are mandatory for the proper operation of the driver.
To configure the driver, you must:
1. Connect all cables as indicated in the previous section.
2. Connect Simhub to the control box (see the next part for setting up Simhub)
3. Disable Power using the switch on the control panel (Power in black on white background).
4. Set the Gain, Preload, and Lateral to the minimum position.
5. Go to the track with a simulation that has been set up for Simhub.

| Parameter	Value	Explication	Note
Pn001	4 ou 6	Select the correct motor, 4 for 80st-M02430, 6 for 80st-M04025	
Pn002	0	Motor control mode	0: torque mode: sends a force command
Pn003	0	Activate/deactivate the driver	0: the driver is turned on by the Arduino. 1: the driver is always on
Pn021	400	Threshold from which it is considered to be spinning too fast	RPM
Pn062	5		
Pn189	30	Gain: the motor's force	You can increase the value once the installation is fully functional.
Pn190	0	Preload: allows adjusting the preload.	Can be left at 0 as the preload is adjusted on the control panel.
Pn191	0	Allows reversing the rotation direction	0: When facing the motor, counterclockwise direction

.

4.Control Box Settings

The control box is delivered ready to use: just set up Simhub so that Simhub communicates the data to the box:

In *custom protocol*, click EDIT and copy the following lines:
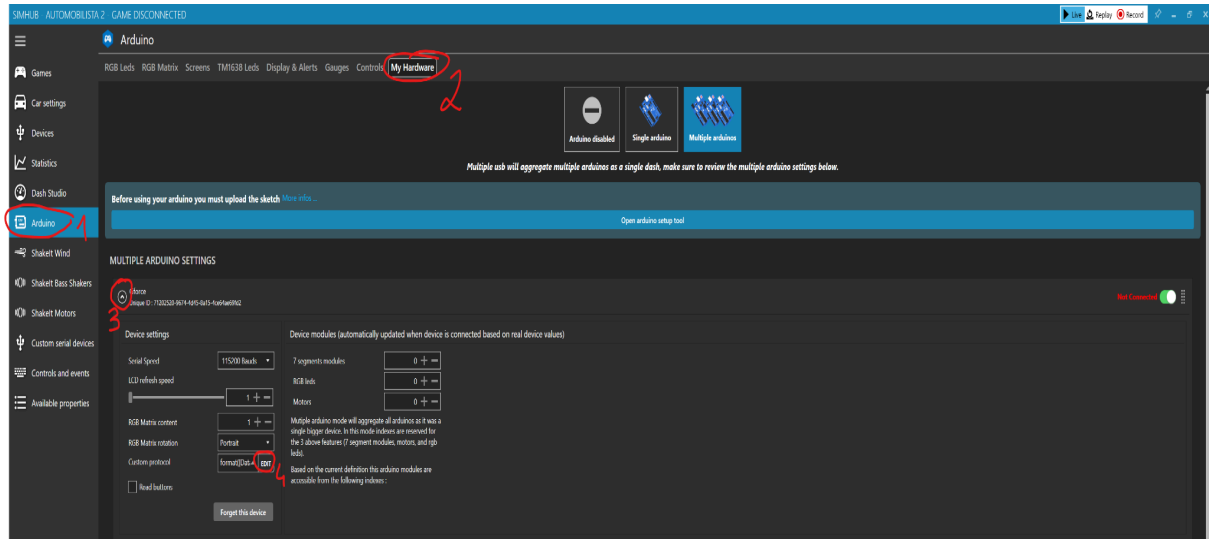

```
format([DataCorePlugin.GameRunning],'0')  +  ';' +
format([AccelerationSurge]*2000,'0')+ ';' +
format([AccelerationSway]*2000,'0' )+ ';' +
 '1'
```

The last number (1) is also a gain. It acts like the gain potentiometer. If you want to increase the force felt but trigger the overload alert, you will need to increase parameter pn190.
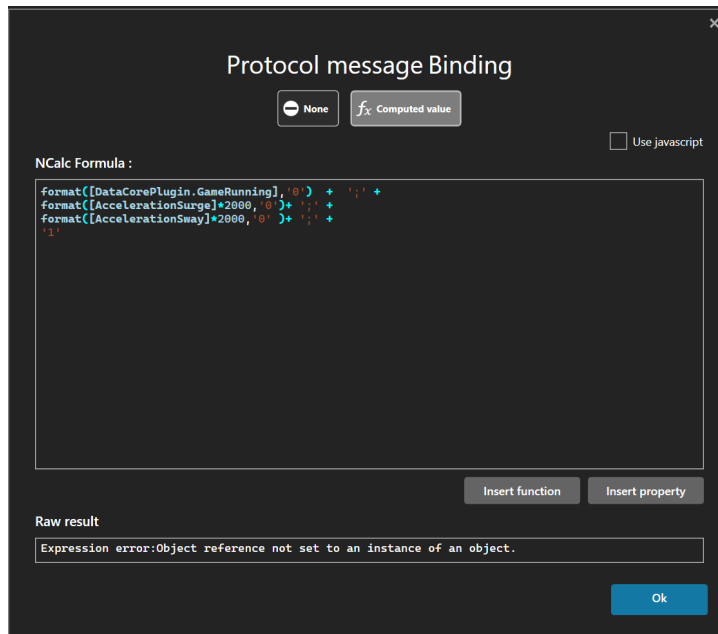
5.Power Reset

As a safety measure, power must always be cut and restored at each new session: this prevents the tensioner from running away while the driver is not ready.

To be active: the drivers are powered only in-game when Simhub is connected to the control box, and the power switch is active. To adjust the drivers without the tensioner being active, just go in-game, set the preload and gain to 0, and activate the power.

6.Control Panel
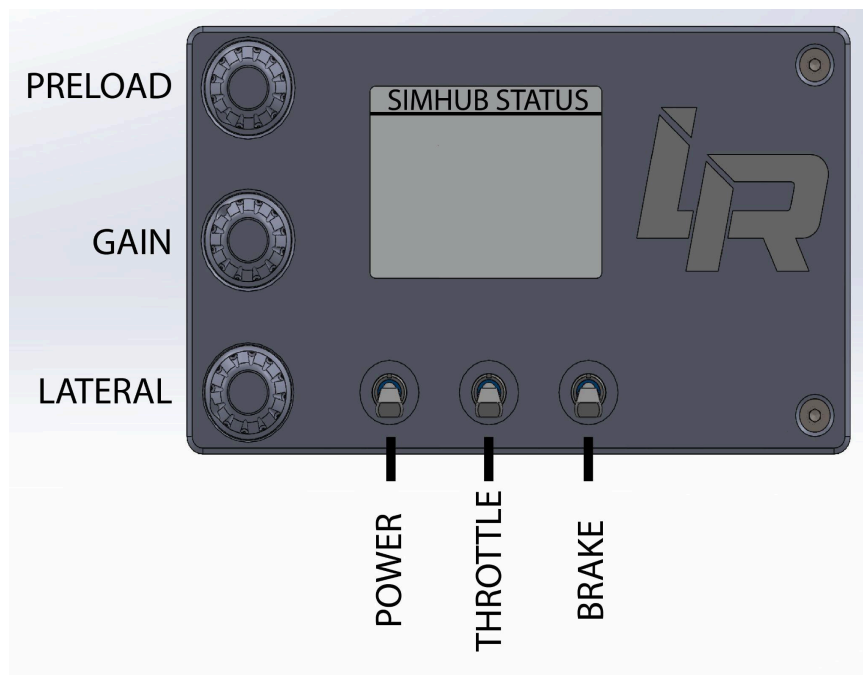
The control panel allows you to adjust the tensioner in real-time.

Simhub Connection Status:

- Simhub Disconnected : Simhub isn't connected. The screen goes into standby after 5 seconds. It will come out of standby if Simhub is connected.
- Simhub Connected : Simhub is connected to the control box. The screen will stay on
- Game running: Simhub is connected, and the car is on the track. From this moment, the tensioner can become active.
- Overload detected : To be effective, the force values of the control box must not exceed 100%. Otherwise, it means that we are saturating, and we will not feel the difference with higher forces. You must then reduce the gain at the control panel level. The message will quickly disappear afterward.
- Turn Power On and Off : this is a safety feature that asks you to cut and restore power. It is displayed in two cases:
1) A new game is launched and the switch was ON: We ask the user to reset the switch position to confirm that it is properly secured.
2) The control box has detected abnormal behavior: for example, if the tensioner detects an abnormally high motor speed.

Switches enable different functions

- The Power switch allows turning the power on or off. The power can only be turned on if Simhub is connected and the car is on the track. In all other situations, the power is cut off.
- The Throttle switch activates the tensioner on acceleration.
- The Brake switch activates the tensioner on braking.

You can activate braking on acceleration and braking simultaneously.

Potentiometers

The potentiometers allow adjusting the force of the tensioner. If the message "Overload Detected" appears, a way to avoid it is to reduce the gain and preload.
The "Lateral" potentiometer allows activating or deactivating the lateral G's while adjusting their force.
The potentiometers have a notch that allows identifying 50%.

The DB15 cable from the control panel is specific: do not use an extension or another DB15 cable.

7.Status LEDs

The control box has three status LEDs:
- P: Power, indicates that the relay is open. If the 220v power cable is connected, then the driver is powered
- R: Right, the right motor is ready to be used (powered and activated)
- L: Left, the right motor is ready to be used (powered and activated)

8.Lateral G's

The control box allows managing two motors, to handle lateral G's. It is both transparent and optional: if you have only one motor, you can use the left or right DB25 port. If you have two motors, there is nothing in the code to modify.
If you use only one motor, you should set the lateral G's potentiometer to the minimum.

9.Troubleshooting

1. The screen stays black: the screen lights up and stays on as soon as Simhub is launched and connected to the box. To check if the problem comes from the control

box: unplug and replug the control box, the screen will at least be on for a few seconds.

2. The drivers remain off: when the control box activates the power, the power LED becomes red. If it does not turn red, it means that the control box has not detected that the game has started, or that the power switch is not activated. If the LED is activated, check the mains supply, and the connection to the drivers.

3. The "Overload Detected" alert appears: reduce the gain in Simhub (the last number), or decrease the preload and gain on the control panel.