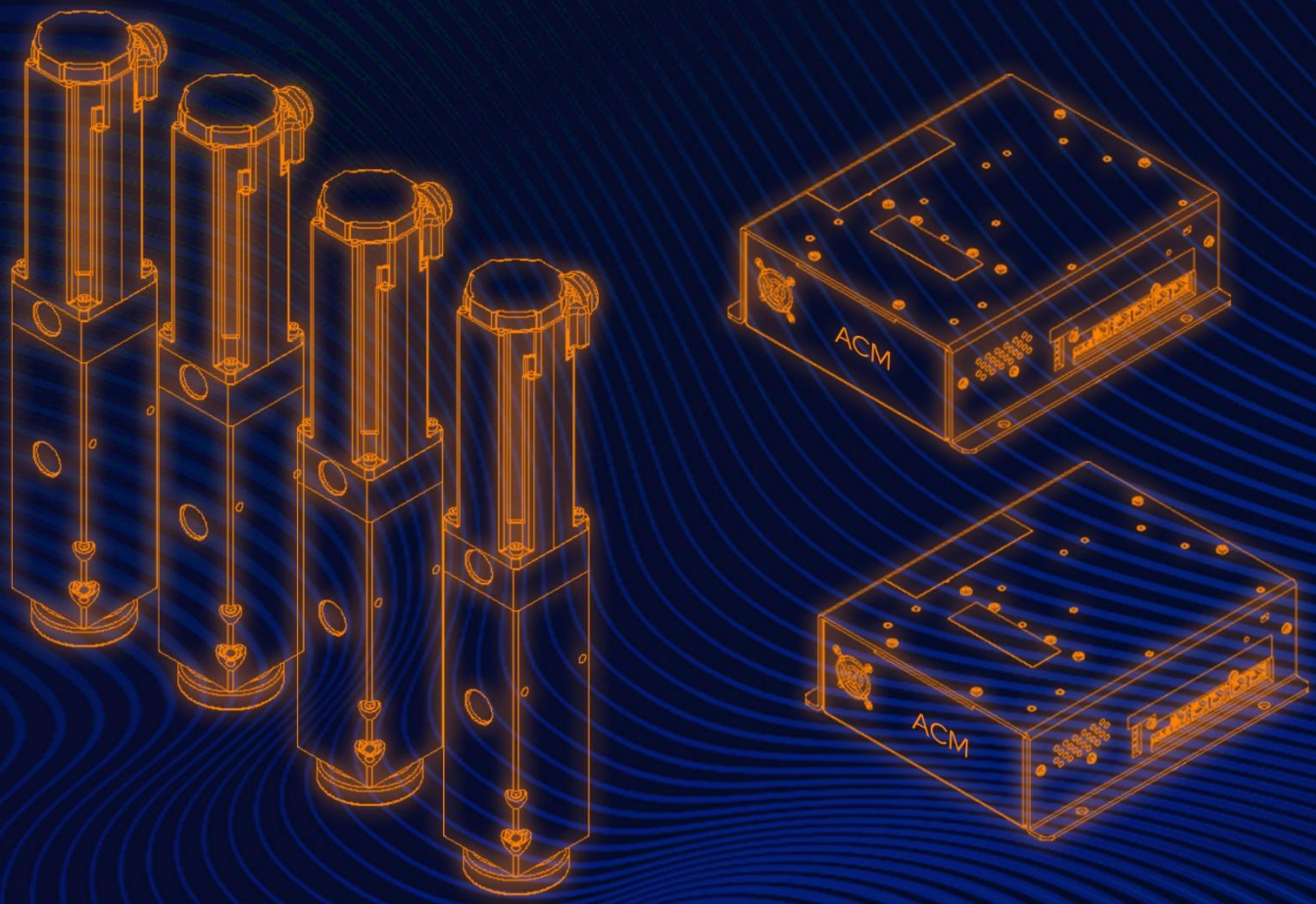
D-BOX G3

G3 HAPTIC SYSTEM

USER GUIDE



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IMPORTANT SAFETY INSTRUCTIONS

- Read, keep, and follow these instructions.
- Heed all warnings:

This D-BOX haptic system may be harmful to women who are pregnant, persons with heart conditions, the elderly, or those with other pre-existing medical conditions. All such persons should consult their physicians before using this D-BOX haptic system.

Use of this D-BOX haptic system is a risk to hands and feet. Do not put hands or feet underneath the seat or near the haptic system. This may lead to serious injury.

Use of hot liquids in the vicinity of this D-BOX haptic system should always be avoided to prevent spillage which could cause serious injuries to the user.

Do not use this device near water.

- Only clean the device with a dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Protect all the cables (USB, network, power, etc.) from being walked on or pinched, particularly at the ends.
- Use only attachments/accessories specified by the manufacturer.

Use of this D-BOX haptic system is not recommended for children under the age of ten years old without adult supervision. Owners and/or users of this D-BOX haptic system should consult and comply with the user guide enclosed.

Unplug this device during electrical storms or when unused for long periods of time.

Do not install near any heat sources such as radiators, heat registers, stoves or any other appliances (including amplifiers).

Refer all servicing to qualified personnel. Servicing is required when the device has been damaged in any way. For example: if liquid has been spilled or objects have fallen onto it, if it has been exposed to rain or moisture, if it does not operate normally or, it has been dropped.

Owners and/or users of this D-BOX haptic system are responsible for the dissemination of this information to all such persons named herein. Each owner and/or user of this D-BOX haptic system agrees to evaluate and bear all risks associated with the use of this D-BOX haptic system for themselves and for any subsequent users of this D-BOX haptic system and any subsequent users of this D-BOX haptic system shall be deemed to be using this D-BOX haptic system under the direct supervision of such owner/user and such owner/user will be deemed to have communicated this advisory to all person described herein.

D-BOX Technologies Inc. is in no way responsible for any damages of any kind arising from the use of this D-BOX haptic system and the owners and/or users of this D-BOX haptic system hereby agree not to hold D-BOX Technologies Inc. responsible for any and all damages of any kind arising from the use of this D-BOX haptic system including, but not limited to direct or indirect, punitive, incidental, special or consequential damages arising out of or in any way connected with the use of this D-BOX haptic system.

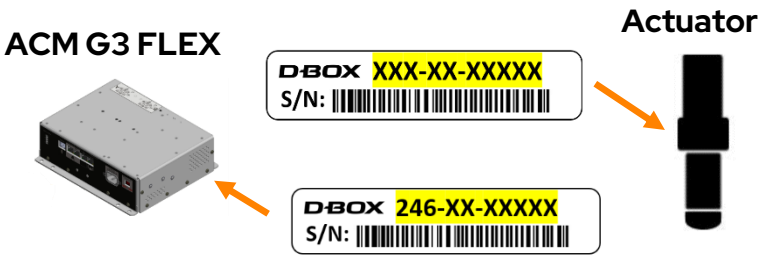
Thank you for purchasing a D-BOX haptic system, the most immersive experience for the simulation and game markets. We strongly advise that you read these guidelines before assembling and using your haptic system.

This user guide details the information for the G3 haptic systems, which include the newest ACM technology (ACM G3 FLEX). Most of the information included also applies to G3 systems using a previous G3 ACM. Refer to section 11 for specific connection information using ACM G3.

Support information:

Please make sure to provide the **serial numbers** of your haptic system (ACM & actuators) when contacting your reseller support team (or the D-BOX Technical Support team if you are an integrator and your system was bought directly from D-BOX). Note that for 3 and 4 actuator system, there may be more than 1 sequence of serial numbers.

The serial numbers (in yellow) are located on the haptic components as follows:



If you have questions:

- Contact your official D-BOX reseller.
- Reach out to D-BOX Technical Support if you purchased directly from D-BOX.
- You can also visit the Help Center section of our website to access our Knowledge Base or chat with D-Buddy, our chatbot.

If remote assistance is required, you must have TeamViewer installed on your PC.

D-BOX Technical Support

2172 rue de la Province, Longueuil, Québec, Canada, J4G 1R7

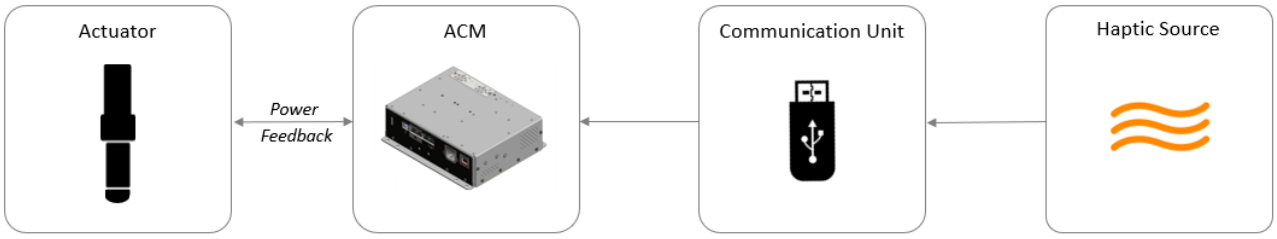
BY EMAIL: support@d-box.com

BY PHONE: 1-888-442-3269 ext. 931 (toll-free CAN/US)
1-450-442-3003 ext. 931 (other regions)

1. Introduction

D-BOX haptic systems are evolutive and scalable. Integrated into a seat, platform, or simulator, they are designed to simulate a range of textures, vibrations and scalable axes of movement. With our G3 haptic system, benefit from a robust and compact actuator form factor while retaining the same core architecture and software integration process that lifted D-BOX ahead of its competitors. This updated version of our renowned G3 haptic system now comes with our ACM G3 FLEX that features a 120/230V switch for flexible power configurations.

The following components are part of a D-BOX G3 **haptic system**:



Haptic system:	A complete architecture of hardware and software providing haptic feedback.
Actuator:	An assembly of motor and mechanic providing motion, texture and vibrations.
ACM (Actuator Control Module):	The controller provides power and control to the actuators. It also controls the power sent to the motor and adjusts the precise rotation according to feedback from an encoder within the actuator.
Communication Unit:	Electronic component used to transmit haptic code, converting a signal format to another one.
Haptic Source:	Various applications generating haptic codes for the D-BOX haptic system.

1.1 G3 haptic system specifications (with ACM G3 FLEX)

	1.5 inches		3 inches		6 inches
Performance under maximum load	**250i / 250 HD**	**400i / 400 HD**	**250i-3**	**400i-3**	**500 HD- 6**
Maximum Lifting Capacity	250lb / 114 kg	400 lb / 182 kg	250lb / 114 kg	400 lb / 182 kg	500 lb / 226 kg
Maximum Stroke	1.5 inch / 38.1 mm		3 inch / 76.2 mm		6 inch / 152.4 mm
Maximum Velocity	100 mm/s		100 mm/s		100 mm/s
Maximum Acceleration	+/- 1 g-force		+/- 1 g-force		+/- 1 g-force
Frequency Range	0-100 Hz		0-100 Hz		0-100 Hz
Operating Temperature Range	0-40 °C		0-40 °C		0-40 °C
Operating Hygrometry	10 to 85% (free from condensing)		10 to 85% (free from condensing)		10 to 85% (free from condensing)
Horizontal Load	Translation on limited friction surfaces can be done on weights up to 3 times vertical lifting capacity.				

			1.5 inches		3 inches		6 inches	
Power Requirements			**Average Power***	**Peak Current ****	**Average Power ***	**Peak Current ****	**Average Power ***	**Peak Current ****
120 V 50/60 HZ	**250 lb**	**1-2 actuators**	213 W	3.75 A	240 W	3.75 A	-	-
		3-4 actuators	426 W	7.5 A	480 W	7.5 A	-	-
	400 lb	**1-2 actuators**	290 W	3.75 A	320 W	3.75 A	-	-
		3-4 actuators	580 W	7.5 A	640 W	7.5 A	-	-
	500 lb	**1-2 actuators**	-	-	-	-	400 W	3.75 A
		3-4 actuators	-	-	-	-	800 W	7.5 A
230 V 50/60 HZ	**250 lb**	**1-2 actuators**	213 W	3.75 A	266 W	3.75 A	-	-
		3-4 actuators	426 W	7.5 A	533 W	7.5 A	-	-
	400 lb	**1-2 actuators**	310 W	3.75 A	373 W	3.75 A	-	-
		3-4 actuators	620 W	7.5 A	746 W	7.5 A	-	-
	500 lb	**1-2 actuators**	-	-	-	-	400 W	3.75 A
		3-4 actuators	-	-	-	-	800 W	7.5 A

* To be used for electric consumption

** to be used for breaker specifications

1.2 Package content

Package content may vary depending which G3 haptic system you acquired.

For haptic system with 1.5-inch travel:

		250lb / 1.5 inch (i and HD)				400lb / 1.5-inch (i and HD)			
Part Number	**Description**	**1250**	**2250**	**3250**	**4250**	**1400**	**2400**	**3400**	**4400**
850-NXX	Actuator	1	2	3	4	1	2	3	4
850-N203	ACM G3 FLEX	1	1	2	2	1	1	2	2
000-100-0579-Z00	Hex bolts, M6 X 1.0 X 16mm	10	10	20	20	10	10	20	20
102-0051	Lock Washer, 1/4	10	10	20	20	10	10	20	20
000-090-0056-Z00	Shielded ethernet cable - 1 foot	1	1	2	2	1	1	2	2
000-090-0136-Z00	Shielded ethernet cable - 13 feet	1	1	2	2	1	1	2	2
000-090-0010-Z00	Power cable (US)	1	1	2	2	1	1	2	2
000-090-0017-Z00	Power cable (Euro)	1	1	2	2	1	1	2	2

For haptic system with 3-inch travel:

		250lb / 3-inch (i and HD)				400lb / 3-inch (i and HD)			
Part Number	**Description**	**1250-3**	**2250-3**	**3250-3**	**4250-3**	**1400-3**	**2400-3**	**3400-3**	**4400-3**
850-NXX	Actuator	1	2	3	4	1	2	3	4
850-N203	ACM G3 FLEX	1	1	2	2	1	1	2	2
100-0551	Hex bolts, 1/4-20 X 3/4	10	10	20	20	10	10	20	20
102-0051	Lock Washer, 1/4	10	10	20	20	10	10	20	20
000-090-0056-Z00	Ethernet cable - 1 foot	1	1	2	2	1	1	2	2
000-090-0136-Z00	Ethernet cable - 13 feet	1	1	2	2	1	1	2	2
000-090-0010-Z00	Power cable (US)	1	1	2	2	1	1	2	2
000-090-0017-Z00	Power cable (Euro)	1	1	2	2	1	1	2	2

For haptic system with 6-inch travel:

		500lb / 6-inch (HD)			
Part Number	**Description**	**1500-6**	**2500-6**	**3500-6**	**4500-6**
850-NXX	Actuator	1	2	3	4
850-N203	ACM G3 FLEX	1	1	2	2
100-0422	Screw, Quadrex, #6-32 X 3/8	6	6	12	12
209-130-0023-B01	ACM access door	1	1	2	2
209-130-0055-A01	ACM actuator door	1	0	1	0
000-090-0056-Z00	Ethernet cable - 1 foot	1	1	2	2
000-090-0136-Z00	Ethernet cable - 13 feet	1	1	2	2
000-090-0010-Z00	Power cable (US)	1	1	2	2
000-090-0017-Z00	Power cable (Euro)	1	1	2	2

- Installation hardware included:
  - Bolts with lock washers for actuator installation
- Power options included:
  - US power cable (120V)
  - Euro power cable (230V)
- Assembly components included (Required for 6-inch travel haptic system (field assembly required))
  - ACM access door
  - ACM actuator door (for system with odd actuator number only)
  - Mounting screws

2. Integration information for commercial use

If your system is used in an integration for commercial use, refer to **Annex 1 - Information for commercial use** for more details on:

- Software integration/API
- Mechanical integration
- Haptic code integration

3. Software installation

There are two (2) D-BOX software packages to be installed on your computer: **D-BOX HaptiSync Center** and **D-BOX System Configurator**. Both are available on our website.

You will also need to set up your D-BOX Connect account: D-BOX Connect is used for haptic codes distribution and authorization service. This is mandatory to install and update haptic codes for D-BOX Coded games and have access to haptic codes for D-BOX Coded movies and series.

3.1 Minimum system requirements (PC)

Here are the minimum requirements to run the D-BOX software on your computer:

- Microsoft Windows 10 x64 (1809 or later) or Windows 11
- 512 MB of free RAM for D-BOX Coded Gaming and an additional 1 GB if using D-BOX Coded Video mode
- 850 MB free space on drive for D-BOX Coded Gaming and an additional 23 GB for the D-BOX Coded Video haptic library
- USB port 2.0 Full Speed (or faster)

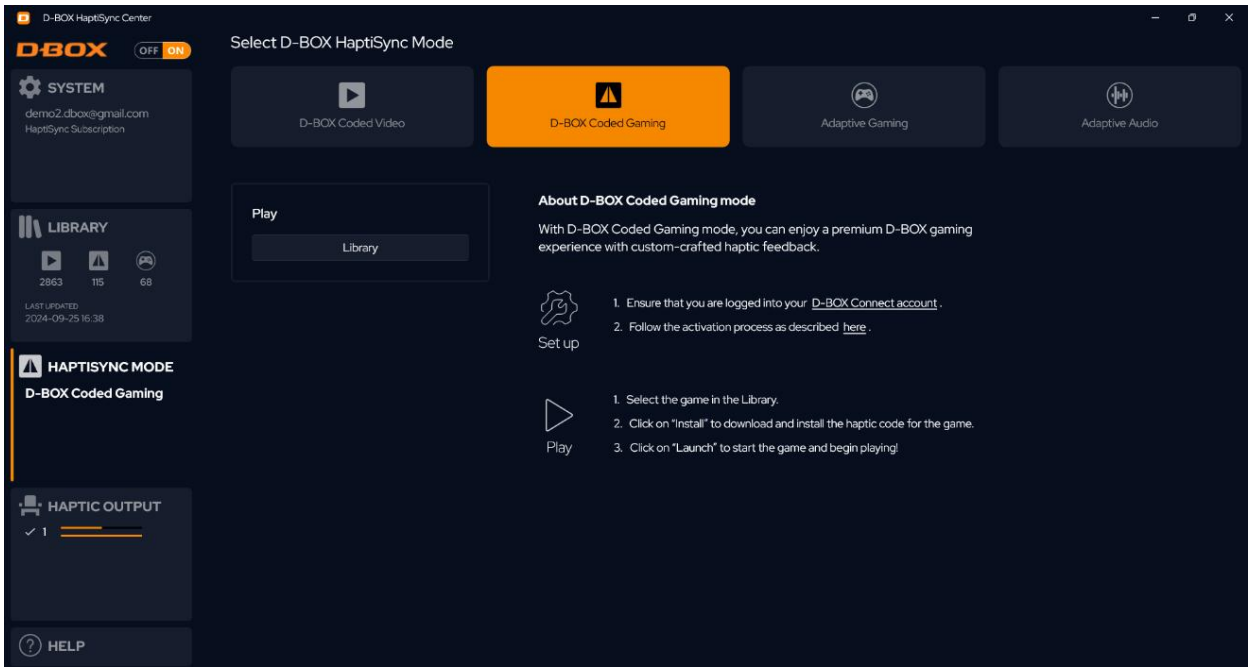
3.2 D-BOX HaptiSync Center

D-BOX HaptiSync Center is an application to manage all experiences enabled by your D-BOX haptic system. This software package includes the system's driver in addition to the following software and utilities:

- D-BOX HaptiSync Center
- D-BOX Adaptive Gaming Configurator
- D-BOX System Monitor
- D-BOX Stimuli Presenter

You can download it from our website. After downloading, simply install the software and follow the on-screen instructions.

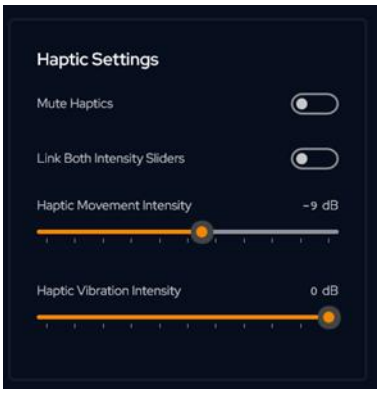
In this software, you can select your haptic experience in the HaptiSync Mode section:

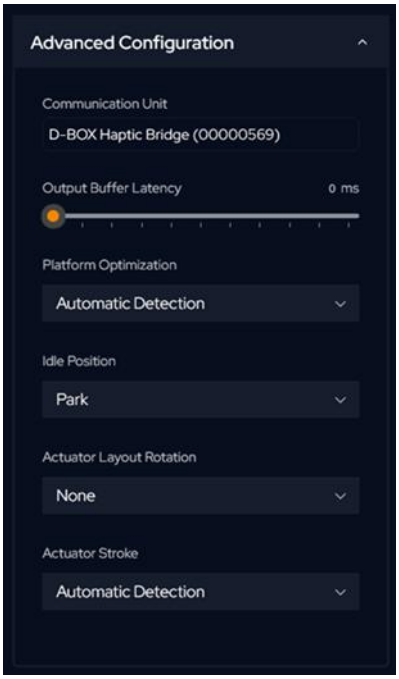


D-BOX Coded Gaming	Premium haptic experiences for D-BOX coded apps, simulators & games. Use the adaptive gaming mode if your title is not in the list. Visit this page for detailed instructions: https://support.d-box.com/en/knowledge/hsc-dbox-coded-gaming
D-BOX Coded Video	Premium haptic experiences for D-BOX coded movies, TV shows, using audio synchronization. Visit this page for detailed instructions: https://support.d-box.com/en/knowledge/hsc-dbox-coded-video
Adaptive Gaming	Haptic experiences using real-time events from game controller or keyboard. Visit this page for detailed instructions on how to use this feature: https://support.d-box.com/en/knowledge/hsc-adaptive-gaming
Adaptive Audio	Automated haptic experiences for any movie, music, TV show and games using audio processing: https://support.d-box.com/en/knowledge/hsc-adaptive-audio

3.2.1 D-BOX HaptiSync Center – Haptic Output section

The Haptic Output section of the D-BOX HaptiSync Center allows you to manage the settings and features related to your hardware. These settings will apply to all games and software on your computer.

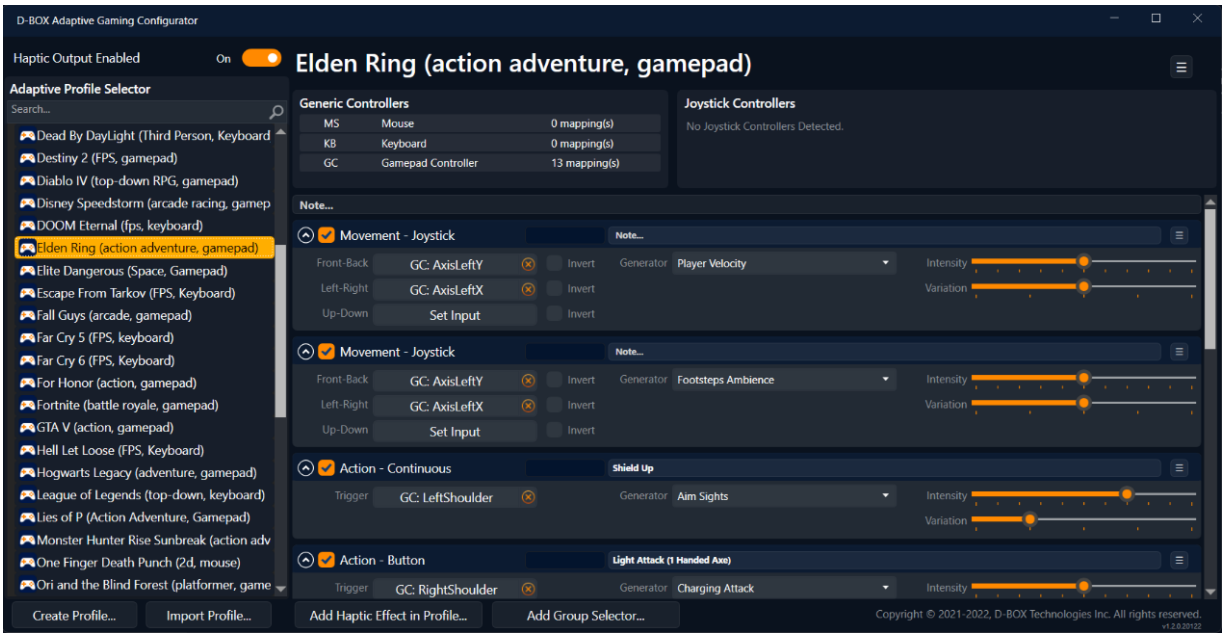




On-screen contextual tooltips provide high-level information on these settings. Please refer to our web Knowledge Base for more details on each of these settings.

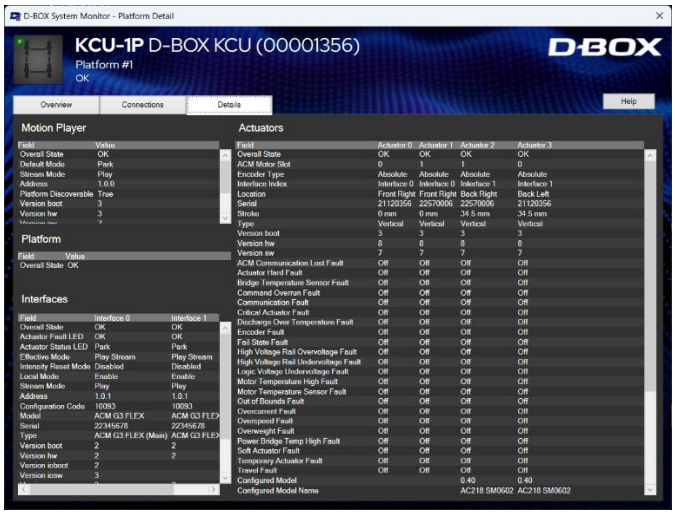
3.2.2 D-BOX Adaptive Gaming Configurator

This application allows you to build, modify and activate your Adaptive Gaming profiles. You can also share your favorite profiles with other D-BOX users!



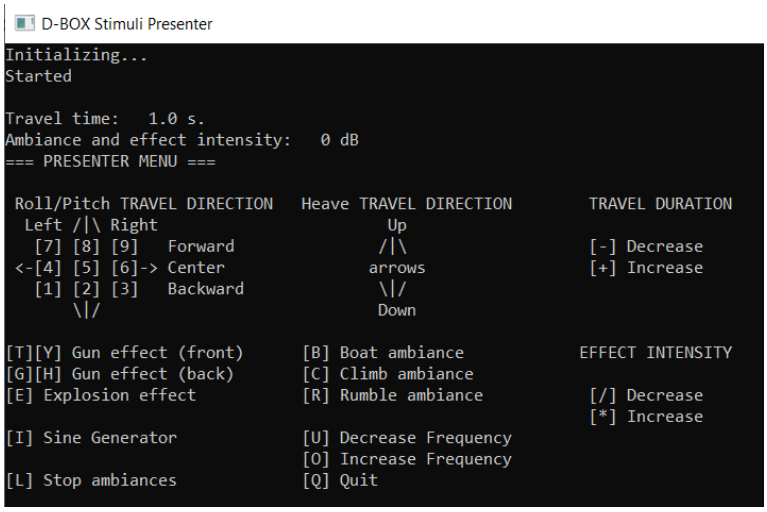
3.2.3 D-BOX System Monitor

This application displays live health and operational data for all connected haptic systems. This is useful to troubleshoot your haptic system:



3.2.4 D-BOX Stimuli Presenter

The D-BOX Stimuli Presenter is a keyboard-controlled application to send basic signals to the haptic system, helpful for tests and demos:



3.3 D-BOX System Configurator

The D-BOX System Configurator is a free software tool used to update your hardware firmware and configure your haptic system.

IMPORTANT: As D-BOX upgrades the ACM firmware on a regular basis, we recommend that you update your equipment to the latest firmware version, upon reception, with the D-BOX System Configurator.

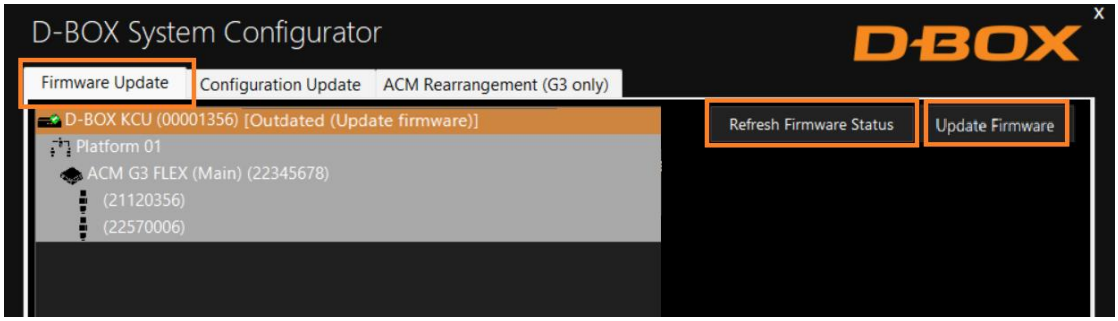
The D-BOX System Configurator is compatible with Microsoft Windows 7, 8, 10 & 11 - 64 bits.

Step 1: Download D-BOX System Configurator

Step 2: Extract the compressed file and run the installer. **Take note that the User Guide is located into the Windows Start menu/D-BOX folder**.

Step 3: Firmware Update:

- Make sure your haptic system is powered on.
- Open the D-BOX System Configurator from the Windows Start menu/D-BOX folder. From the **Firmware Update** tab, click **Refresh Firmware Status.**
- If the system shows ''*Outdated (Update firmware)*'', click **Update Firmware** and follow the on-screen instructions:



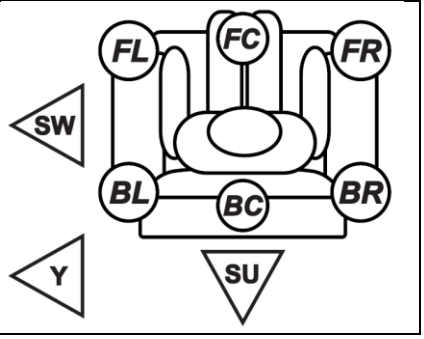
Step 4: Configuration Update:

Each ACM comes with a default configuration based upon the haptic system architecture. Here is the list of the factory configurations. The letters describing the actuator position refers to the next table.

HAPTIC SYSTEM ARCHITECTURE	FACTORY CONFIGURATION	ACTUATOR POSITION (See figure below)	DESCRIPTION
1 actuator	1 YAW	Y	1 Main ACM with 1 horizontal actuator ensuring the YAW movement of the simulator.
2 actuators	2 BACK	BL - BR	1 Main ACM with 2 actuators at the back of the pivot point on the simulator.

HAPTIC SYSTEM ARCHITECTURE	FACTORY CONFIGURATION	ACTUATOR POSITION (See figure below)	DESCRIPTION
3 actuators	1 FRONT/2 BACK	FC – BL - BR	1 Main ACM with 2 actuators at the back of the simulator. 1 Secondary ACM with 1 actuator at the front of the simulator.
4 actuators	2 BACK/2 FRONT	BL – BR –FL - FR	1 Main ACM with 2 actuators at the front end of the simulator. 1 Secondary ACM with 2 actuators at the back end of the simulator.

The letters represent the position of the actuators:

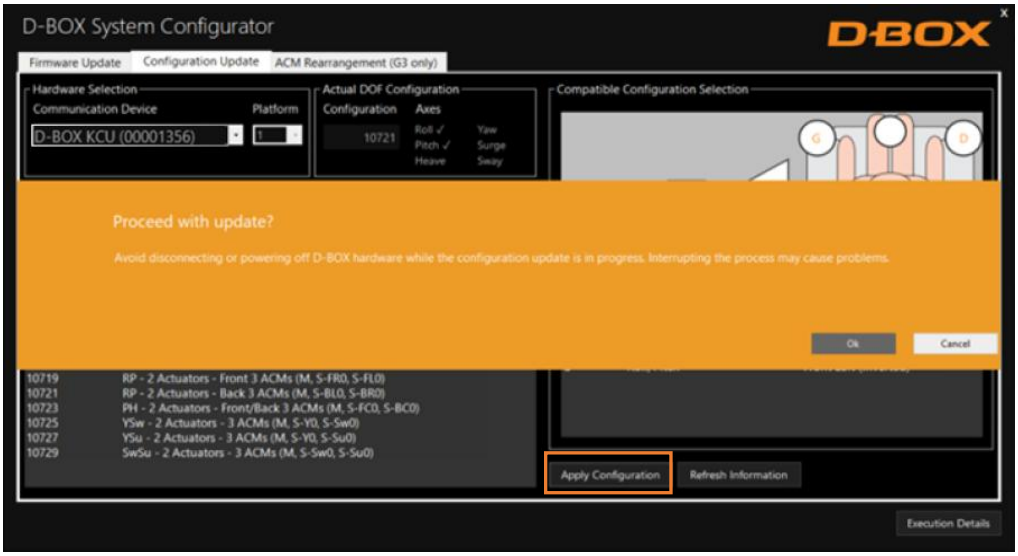
LEGEND	POSITION	PICTOGRAM REFERENCE
FL	Front-Left	
FC	Front-Center	
FR	Front-Right	
BL	Back-Left	
BC	Back-Center	
BR	Back-Right	
SU	Surge	
SW	Sway	
Y	Yaw	

You may have a configuration requirement different from the factory configuration. If this is the case, you need to change it using the D-BOX System Configurator to modify the configuration BEFORE you install your haptic system. The D-BOX System Configurator application attributes a specific ACM port to each actuator position.

A good practice is to modify the dots on the sticker of your ACMs to reflect the new configuration.

The **Configuration Update** tab of the D-BOX System Configurator allows you to configure your haptic system (actuator positions and axes (Degree of Freedom - DOF)).

- Select the **Configuration Update** tab. Click **Refresh Information**. Make sure the **Actuator Count** matches with your system. If not, make sure that all power cables and RJ45 are firmly connected.
- Enter the configuration number matching your system or select the axes you want for your system.
- Once the configuration is chosen, click the **Apply Configuration** button to start the configuration update process, then follow the on-screen instructions:



4. Communication Unit : KCU-1P

The KCU-1P is a Communication Unit that transmits the data from the haptic source to the first ACM in the chain.

CAUTION: Avoid connecting the KCU-1P into the USB port of a Windows computer before the D-BOX HaptiSync Center software suite has been installed. Although the application installs itself as soon as the KCU-1P is connected to the computer, it requires driver files to complete the installation process.

CAUTION: The KCU-1P works with a D-BOX G2, G3 and G3 FLEX ACMs. Never connect the KCU-1P to an ACM-I (G1).

The KCU-1P comes with a USB cable, an installation bracket and a power supply. It has 2 ports and a power input jack.

PORTS / JACK	RECOMMENDED CABLE	COMMENTS
MASTER OUT Connect the KCU-1P to the ACM	Use the provided shielded CAT.5e cable included with your haptic system package.	• If not using the provided cable, make sure you use a shielded CAT.5e or CAT.6e cable and the RJ-45 at each end features a metal jacket. The total length should be 100 ft. (30.5m) or less (KCU-1P to last haptic system). • Connect one end of the cable to the MASTER OUT port of the KCU-1P. • Connect the other end of the cable to the MAIN IN Port of the ACM.
USB Connect the KCU-1P to the computer	Use the provided USB-A / USB-B cable to connect the KCU-1P to the computer.	• Connect the USB-B end of the cable to the USB port of the KCU-1P. • Connect the USB-A end of the cable to the USB port of the computer. • If not using the provided USB cable, the total length of the USB cable you use should be 6 ft (1.8m) or less.
POWER	100 – 230VAC, 50 - 60Hz, 0.63A Output: +48VDC	• Always connect the power cable to a grounded receptacle.

4.1 KCU-1P power up

At power up, the front LED shows the status of the KCU-1P.

Power up sequence:

- RED: 48V power present but no USB connection.
- ORANGE: Connected to the computer USB port, drivers are installed. The unit is ready to operate.
- GREEN: Active Motion.

For more information on the LED status, refer to the Troubleshooting section (**section 10.1**).

NOTE: **One KCU-1P can provide the haptic signal for a maximum of 20 daisy-chained ACMs G3 and 63 daisy-chained ACM G3 FLEX .**

5. Actuator Control Module (ACM)

5.1 ACM families and compatibility

There exist multiple ACMs in the G3 architecture. This section covers all details for the ACM G3 FLEX.

> Should you have a system using an older version of our ACMs (G2 or G3), please refer to **Annex 2 – G3 haptic system using older ACM versions (ACM G3 or ACM G2)**

In the G3 architecture, the ACMs are only compatible with a G3 actuator (motor and mechanics). Different generations of components are not compatible with each other.

5.2 Voltage selection

Set the ACM G3 FLEX voltage according to your region's power requirements using the selector switch next to the power connector.

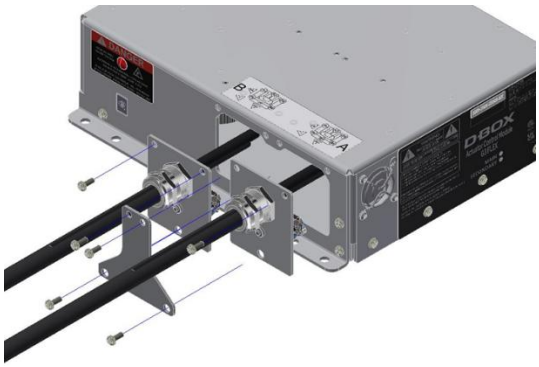
120V ←→ 230V

5.3 ACM door installation (6-inch travel haptic system only)

For 6-inch travel haptic systems: The actuators come packaged separately from the ACM. Connect the actuator(s) and secure the access door using the provided Quadrex screws. If using a single actuator with the ACM, install the actuator door using the provided Quadrex screws.

If one actuator connected to the ACM:

If 2 actuators connected to the ACM:



5.4 ACM Connections

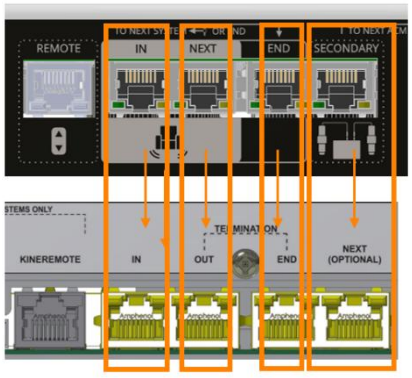
Depending on the ACM position in the system, it is programmed as:

- **MAIN:** First ACM in a haptic system
- **SECONDARY:** All following ACMs

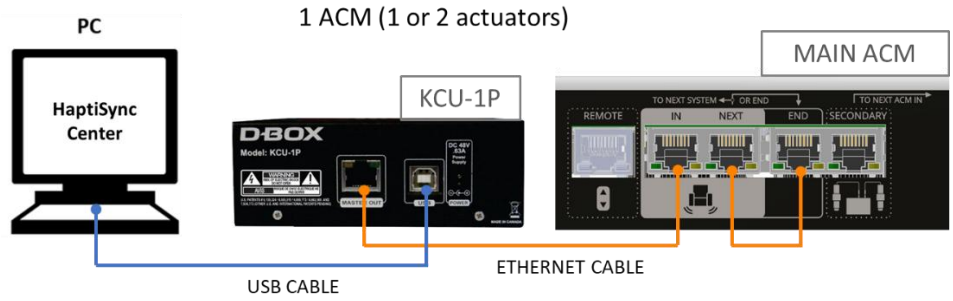
The last MAIN and SECONDARY ACM(s) in the chain must always be terminated using a 1-foot shielded CAT5e cable, connecting from NEXT to END ports of ACM.

It is to be noted that the ACM ports have been renamed on the ACM G3 FLEX. However, they are in the same order as on the ACM G3.

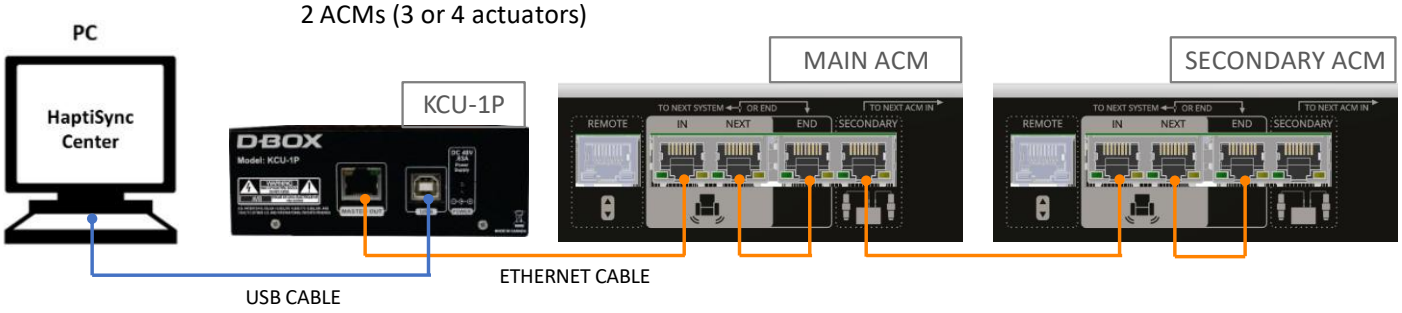
ACM G3	ACM G3 FLEX
IN	IN
OUT	NEXT
END	END
NEXT (OPTIONAL)	SECONDARY
KINEREMOTE	REMOTE



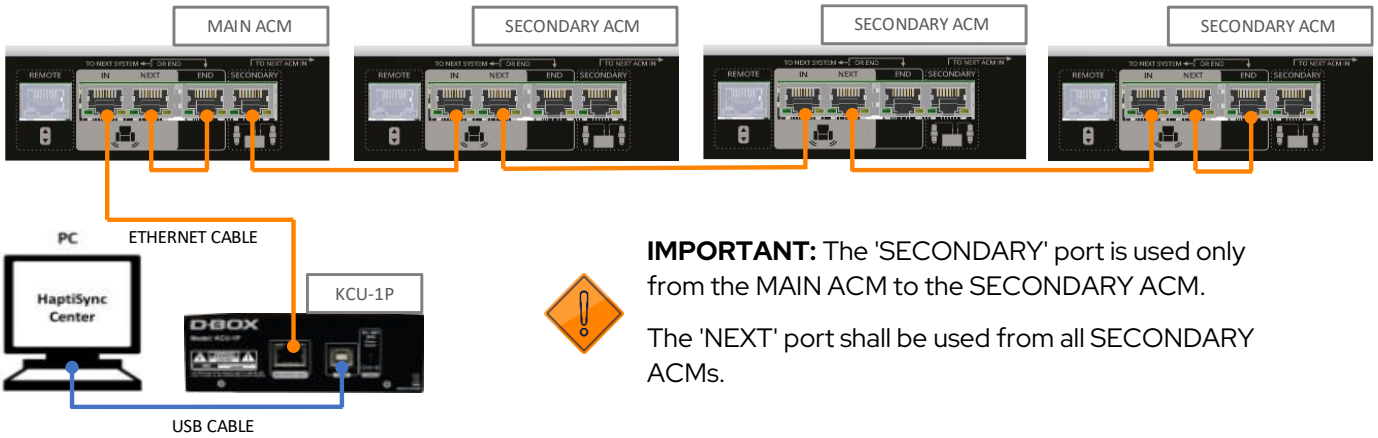
Here are typical ACM configurations for the connection of a single haptic system:



2 ACMs (3 or 4 actuators)



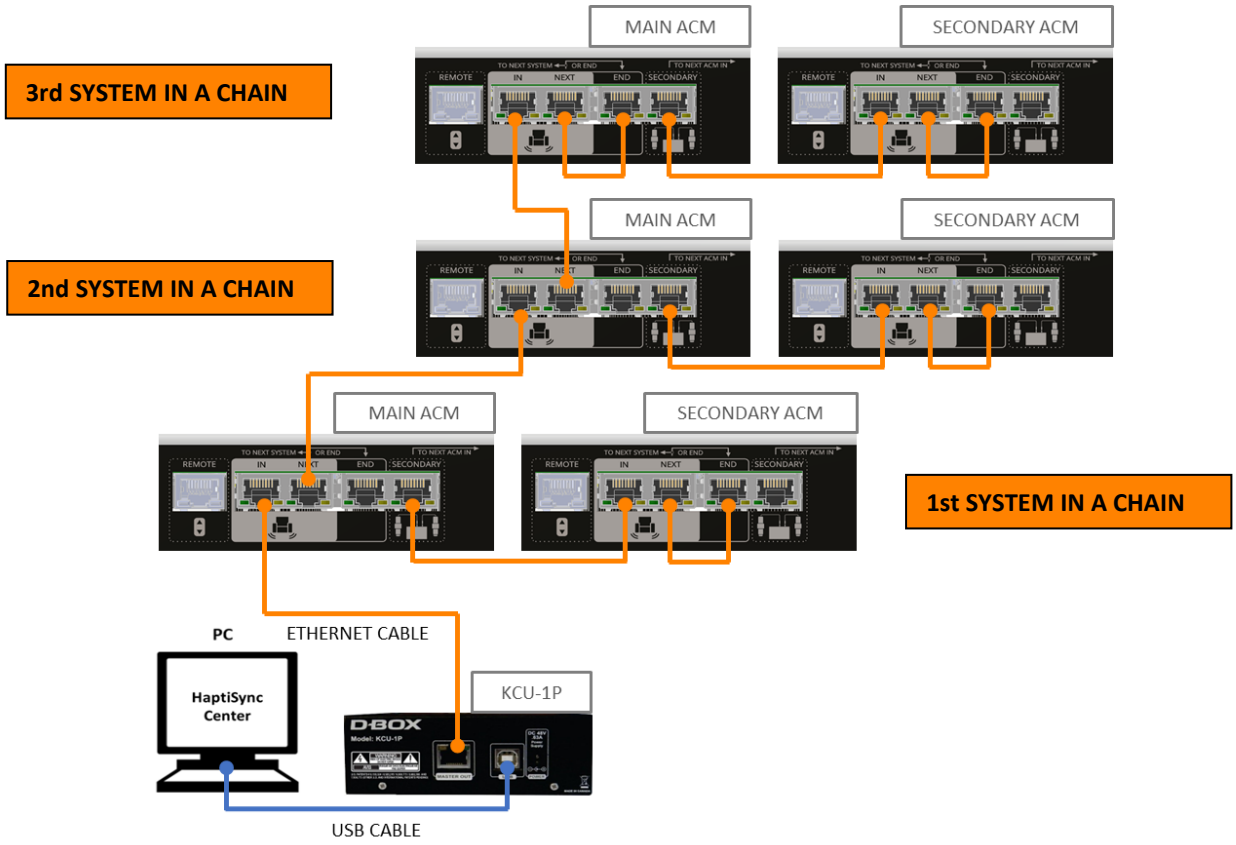
4 ACMs (7 or 8 actuators)



IMPORTANT: The 'SECONDARY' port is used only from the MAIN ACM to the SECONDARY ACM.

The 'NEXT' port shall be used from all SECONDARY ACMs.

The following example shows 3 D-BOX haptic systems using 2 ACM G3 FLEX each. In this case, the 3 systems are daisy-chained.



6. Actuator

6.1 Maximum axial load

The following table shows the maximum axial load for each actuator:

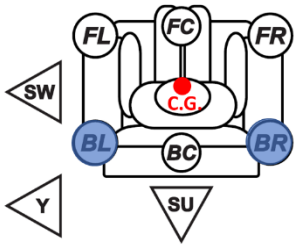
TRAVEL	ACTUATOR MODEL (mechanics name)	MAX AXIAL LOAD lb.	MAX AXIAL LOAD[1] $N_{D\text{-}BOX}$ – System Monitor
1.5 in	**250HD (AC10)**	250	1900
	400HD (AC10)	400	2400
	250i (AC218)	250	1900
	400i (AC218)	400	2400
3.0 in	**250i-3 (AC231)**	250	1900
	400i-3 (AC231)	400	2400
6.0 in	**500HD-6 (AC360)**	500	2800

[1]You can find the reference to the maximal axial load in D-BOX System Monitor. The Newton units are a reference to the load perceived by each motor but can't be converted into actual Newtons. Therefore D-BOX uses the eponym index.

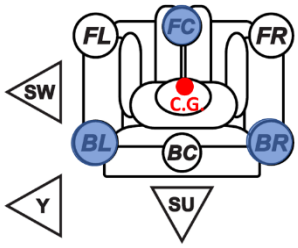
- Make sure that the weight on the platform is no higher than the maximum supported weight.
- Make sure that the weight is evenly distributed among the actuators of the platform (as centered as possible).

6.2 Weight distribution

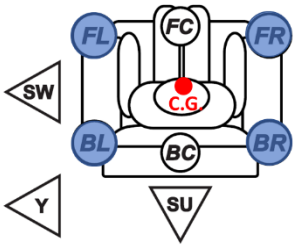
Each actuator has an individual maximal payload as previously mentioned. When integrating the haptic system on a platform, D-BOX recommends balancing the **center of gravity** (CG) of the platform to ensure **each actuator supports an equal load**. The following figures show equal distribution of weight with 2, 3 or 4 actuators.



2 actuators



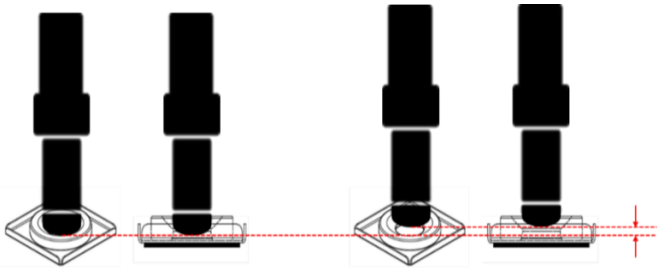
3 actuators



4 actuators

6.3 Actuator acceleration

The D-BOX haptic system can produce a 1G acceleration or greater. However, to avoid risks of injury for the user or damage to the equipment, D-BOX recommends calibrating the haptic system to produce a maximum of 1G, using the intensity sliders found in HaptiSync Center. An acceleration above 1G can make the platform jump. Jumping can be observed when the actuator takes off from the ground. The following figures show a piston jumping in its cup:

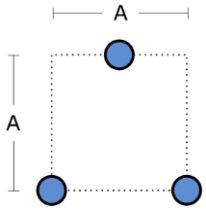


The shock of a piston falling back down in its cup reverberates on the top bearing of the piston, which takes the hit to protect the motor. As it progressively wears, the bearing also becomes noisier, reducing the service life of the ball nuts and screw. Avoid actuator jumping in the cup.

This behavior is typical when running the platform with no or light weight. There are no guidelines as to minimum weight; this is highly dependent on the actuators position, the haptic code, the simulator weight, simulator structure and weight distribution.

6.4 Distance between actuators

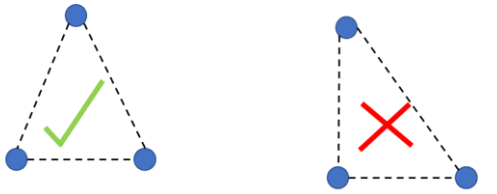
Respect the minimum distance between actuators for adequate movement of the platform. Measure the distance from a **square surface enclosing all actuators** - see example below. Respecting the spacing guidelines ensures proper interaction of the haptic system with the actuator endings, and proper lateral force transfer:



TRAVEL	MINIMUM SPACING BETWEEN ACTUATORS (A)
1.5 in	14 in [356 mm]
3.0 in	24 in [610 mm]
6.0 in	36 in [914 mm]

6.5 Actuator alignment

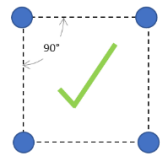
When using 2 actuators + pivot or, 3 actuators, install them per an isosceles triangle pattern:



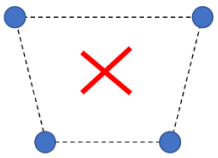
Adequate actuator integration

Inadequate actuator integration

When using 4 actuators, install them per a square or rectangular pattern:



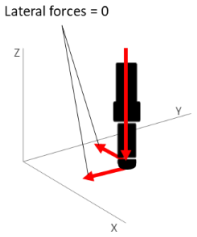
Adequate actuator integration (square/rectangular)



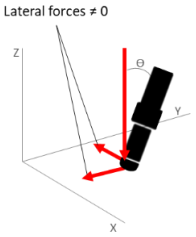
Inadequate actuator integration

6.6 Actuator straightness

During installation, the actuators should always remain straight to limit radial loading. Radial loading could result in premature wear of the actuators.



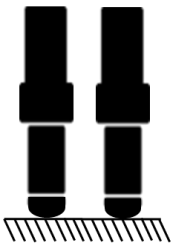
Adequate actuator position



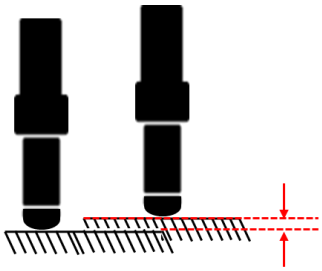
Inadequate actuator position

6.7 Level surface

All actuators must be level on the same flat surface for optimal operations. Different levels could result in premature wear of the actuators.



Equal level of actuators



Unbalanced level of actuators

6.8 Usage of 6-inch actuators for lateral motion

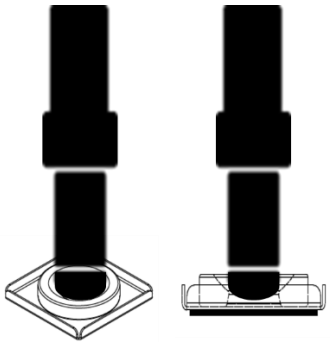
The 6-inch actuator has a play of approximately 1mm, inherent to its design. This play can be felt when used in lateral motion (yaw, surge, and sway) and impact the realism of the simulation. It is important to note that the play does not interfere with usage of such system in general simulation. But it has been reported as problematic by sim-racing professional.

7. Actuator ending installation

G3 actuators can be installed with a captive or non-captive endings. Captive endings are required when you want to bind the actuators to the floor or a sub frame.

7.1 Non-captive ending installation

Once the actuators are installed on your platform, simply drop the actuators (and pivot for 2-actuators configuration) into the provided sliding cup. Also ensure the metal plate is placed under the cup. Actuators and pivot must be centered into their respective ending:



7.2 Captive ending installation

Some platforms may require the use of an actuator ending that binds the actuator to the floor or a frame. The D-BOX captive ending (ball joint) allows proper actuator movements.

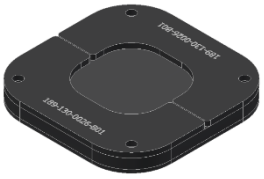
There are 2 models of captive endings:

OEM: use with 6in (AC360) actuators.

OEM LITE: use with 1.5in (AC218, AC10) and 3in (AC231) actuators.

The D-BOX captive ending is a 2 components assembly:

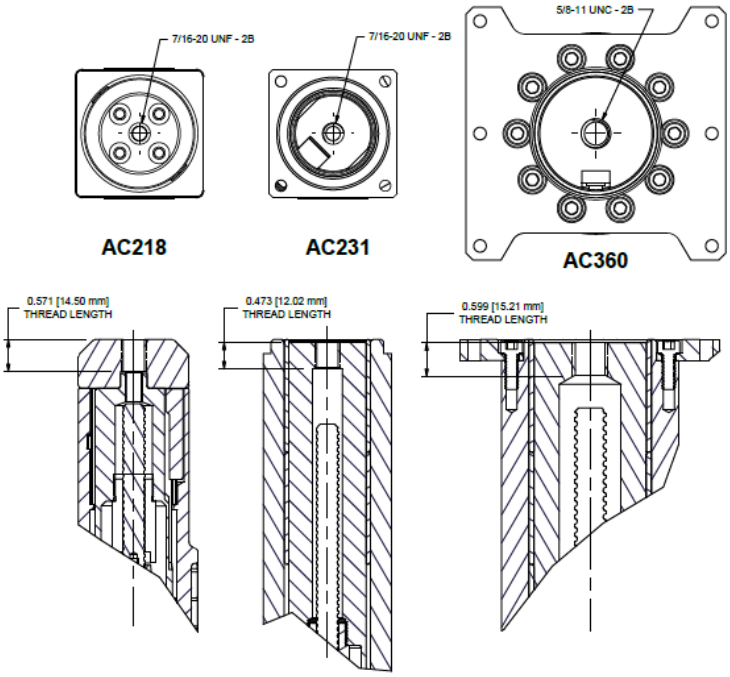
Ball Joint



Spacer Retainer

CAUTION: Respect the orientation of the spacer retainer to avoid any damage to the haptic system.

The thread of the captive endings for each actuator is as follow:



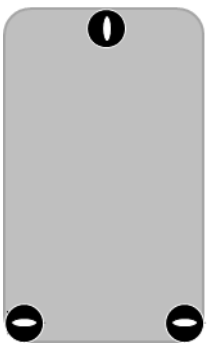
Spacer retainer

The spacer-retainer allows specific movements of the ball joint on both x and y axes, thus eliminating any constraints during the movement of the platform. There are 3 models of spacer retainer. All spacer retainers can be fitted on any model of ball joint.

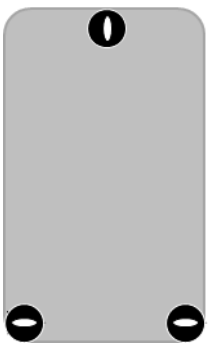
	0 axis	allowing no movement in x and y axis.
	1 axis	allowing movement only on 1 axis (x or y).
	2axes	allowing movement on 2 axes (x and y).

CAUTION: Respect the orientation to avoid any damage to the components of the platform.

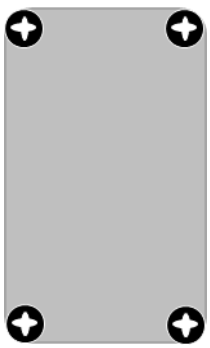
Here are some spacer retainer configurations.



2 actuators and pivot

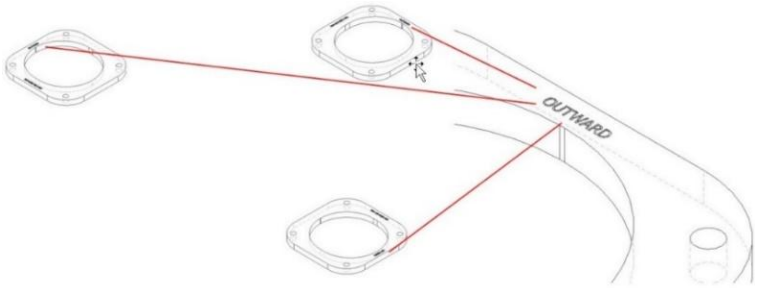


3 actuators

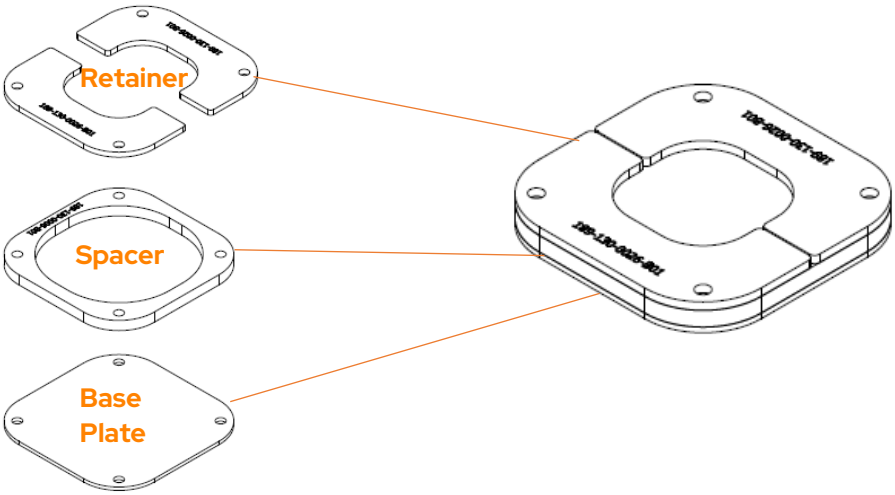


4 actuators

To help with positioning, the spacer retainer is marked **OUTWARD** on its top surface:

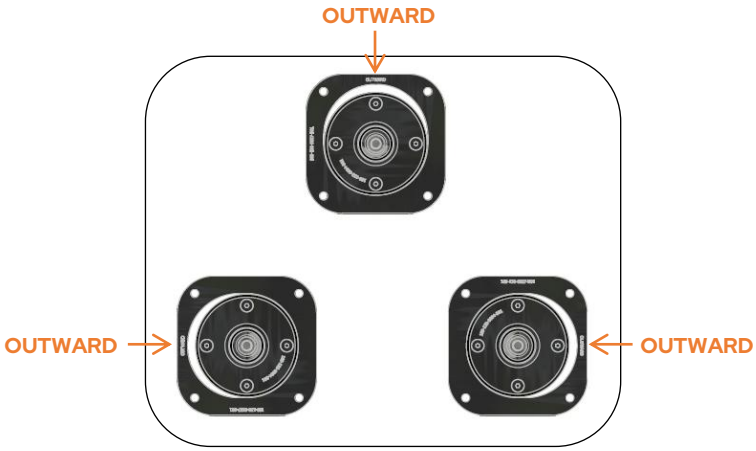


NOTE: Base plate (including with the spacer retainer kit) must be installed at the bottom of the assembly. This will allow the captive ending sliding properly:



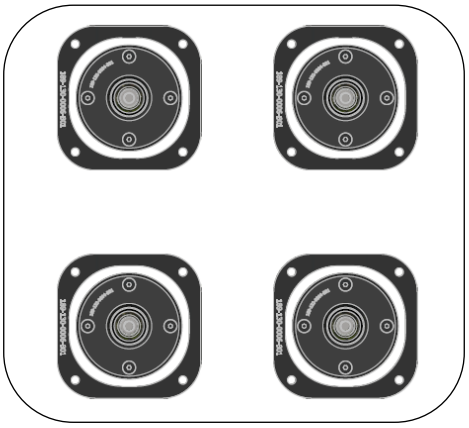
2 or 3 actuators:

Captive endings must be installed off-centre from the spacer retainers as follow:



4 actuators:

Captive endings must be installed in the middle of the spacer retainers as follow:



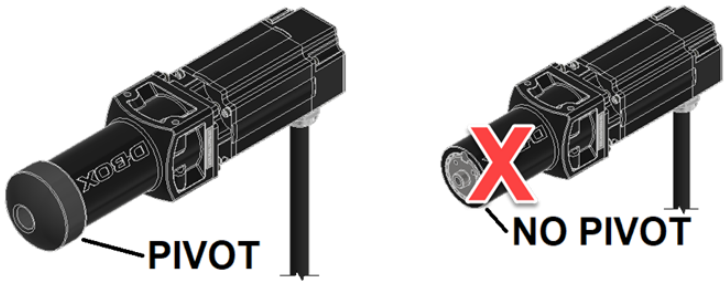
Tools required:

	Short Hex Key • 4mm (for AC218 OEM, AC218 LEG, AC218 captive ending) • 5mm (for AC218 anchor, AC218 luxury) • 6mm (for AC211 MFX-ILC) • 1/8 (for AC7i) • 3/8 (for AC7 delrin, AC7v-ABS, AC231, AC211 ABS, AC10 Straight, AC360 non-abs) • 3/16 (for AC7r) • 1/2 (for AC360 ABS) • 9/64 (for AC231…)
	Wrench 5/8
	Adjustable Wrench or Wrench • Wrench 1 1/4 (for AC7, AC231) • Wrench 1 3/8 (for AC211) • There is no flat spot for AC218, AC10, AC360.

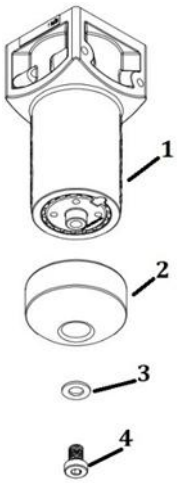
Here are installation instructions for the D-BOX captive endings/ball joints. Make sure all the parts are clean before installation.

1.5-inch actuator - AC218

CAUTION: Never operate the AC218 actuator without the pivot installed. Operating the AC218 actuator without the pivot leads to irreparable damages to the actuator.

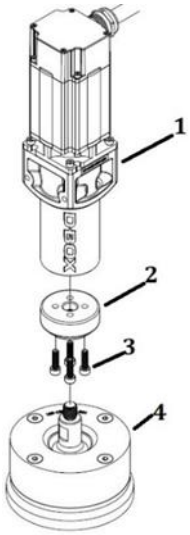


Removal



- Pull the piston out of its body until you can access the flats on both side of the shaft.
- Position the wrench around the flat spot to hold the piston while performing next step and prevent rotation.
- Unscrew bolt (4) with the ½ hex key and remove washer (3) and pivot (2) from the actuator (1).

Installation



- Apply Threadlocker Loctite 263 to the threaded section of bolts (3) and ball joint (4).
- Install the AC218 adaptor (2) on actuator (1) with bolts (3). Torque bolts to 50 lbf in.
- Screw the threaded section of ball joint (4) in the actuator (3). Use a torque wrench with a 5/8 crow foot socket to tighten the ball joint (4) in the actuator. Torque to 170 lbf in.

1.5-inch actuator - AC218

- Place the spacer (5) at its required location.
- Make sure the holes for the spacer are aligned with the holes of the base plate (6).
- Slide the retainers (7) on spacer (5) and in the slot on the ball joint

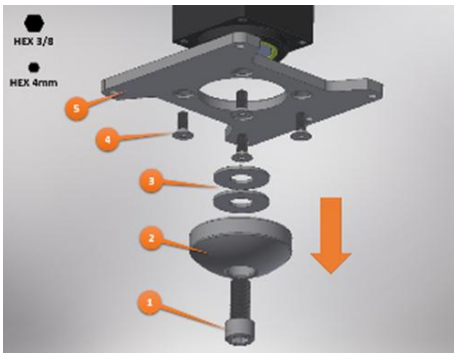
- Slide the retainers (7) on spacer (5) and in the slot on the ball joint assembly.

- Align the holes of the retainer, spacers, and base plate. Use 5/16 bolts to tighten the assembly to the floor.
- NOTE: the way the ball joint is anchored to the floor is the same for all actuators (1.5", 3", and 6").

Never operate the Haptic Actuator without the back plate installed. This may lead to malfunction or damages to the Haptic Actuator.

3-inch actuator – AC231

Removal



- Pull the piston out of its body until you can access the flats on both side of the shaft.
- Position the wrench around the flat spot to hold the piston while performing next step and prevent rotation.
- Unscrew bolt (1) with the 3/8'' HEX key and remove ending (2) and washers (3) from the piston. Unscrew bolt (4) with the 4mm HEX key and remove the H-bracket (5) (Optional) from the actuator.

3-inch actuator – AC231

Installation

- Add Threadlocker Loctite 263 to the threaded section.
- Screw the threaded section in the actuator. Use a torque wrench with a 5/8 crow foot socket to tighten the ball joint assembly in the actuator. Torque to 170 lbf in.

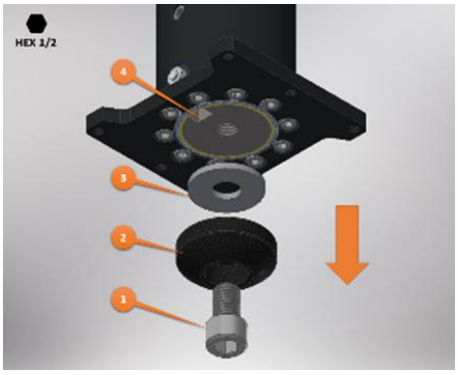
- Place the spacer (1) at its required location.
- Make sure the holes for the spacer are aligned with the holes of the base plate (2).

- Slide the retainers (3) on spacer (1) and in the slot on the ball joint assembly.

- Align the holes of the retainer, spacers, and base plate. Use 5/16 bolts to tighten the assembly to the floor.
- NOTE: the way the ball joint is anchored to the floor is the same for all actuators (1.5”, 3”, and 6”).

6-inch actuator – AC360

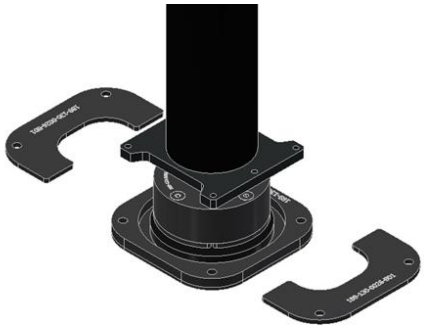
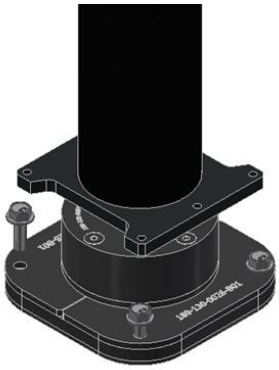
Removal



- Pull the piston out of its body until you can access the flats on both side of the shaft.
- Position the wrench around the flat spot to hold the piston while performing next step and prevent rotation.
- Unscrew bolt (1) with the ½'' HEX key and remove ending (2) and washer (3) from the piston (4).

Installation

- Place the spacer (1) at its required location.
- Make sure the holes for the spacer are aligned with the holes of the base plate (2).

6-inch actuator – AC360	
	• Place the spacer (1) at its required location. • Make sure the holes for the spacer are aligned with the holes of the base plate (2).
	• Slide the retainers (3) on spacer (1) and in the slot on the ball joint assembly.
	• Align the holes of the retainer, spacers, and base plate. Use 5/16 bolts to tighten the assembly to the floor. • NOTE: the way the ball joint is anchored to the floor is the same for all actuators (1.5”, 3”, and 6”).

8. Bracket installation

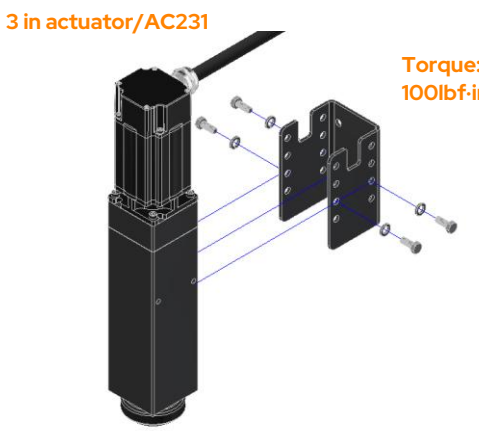
D-BOX offers two (3) types of brackets: ‘‘**H**’’, ‘‘**L**’’ and ‘‘**U**’’ shaped. They can be bought as an option to your haptic system. The screws to attach your actuator to the bracket are included with your haptic system. However, you need to provide the screws to mount the brackets to your platform.

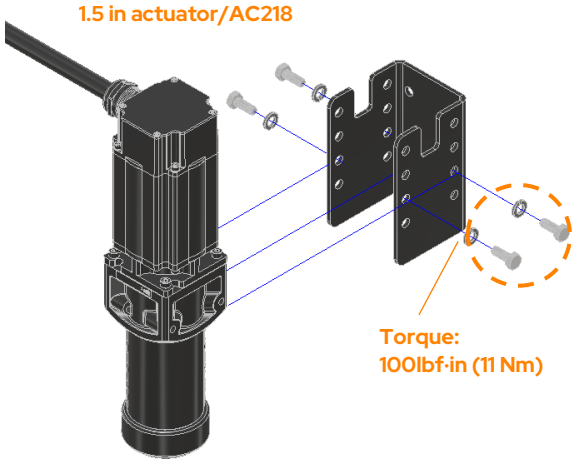
The table below lists the available brackets per type of actuator:

TRAVEL	ACTUATOR MODEL (mechanics name)	"H" Bracket	"U" Bracket	"L" Bracket
1.5 in	250HD (AC10)	✓	-	-
	400HD (AC10)	✓	-	-
	250i (AC218)	-	✓	✓
	400i (AC218)	-	✓	✓
3.0 in	250i-3 (AC231)	✓	✓	✓
	400i-3 (AC231)	✓	✓	✓
6.0 in	500HD-6 (AC360)	✓	-	-

8.1 « U » brackets installation

Install the ''U'' bracket first on your platform then attach the actuators to the brackets using the provided screws.

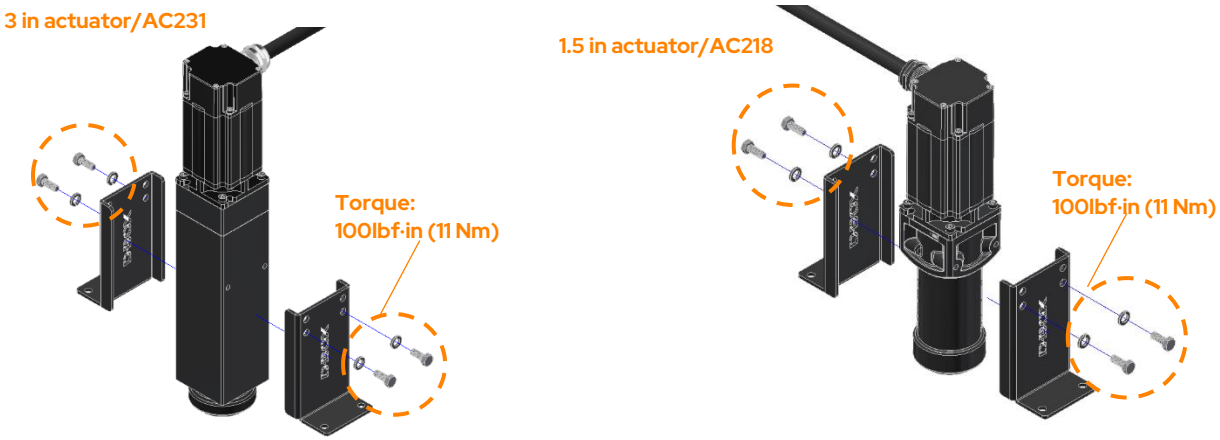




NOTE: Screws to attach the bracket to your platform are not included.

8.2 « L » brackets installation

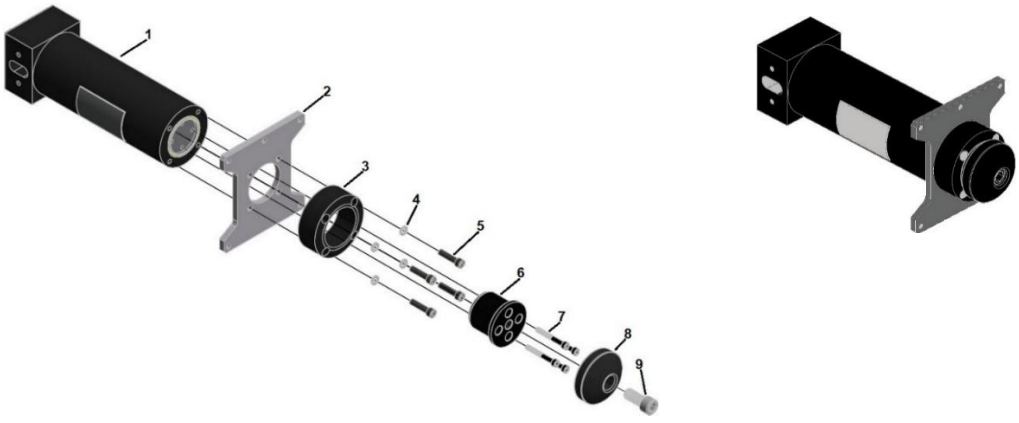
Install the ''L'' bracket first on your actuator using the provided screws then attach the assembly to your platform:



NOTE: Screws to attach the bracket to your platform are not included.

8.3 « H » bracket installation

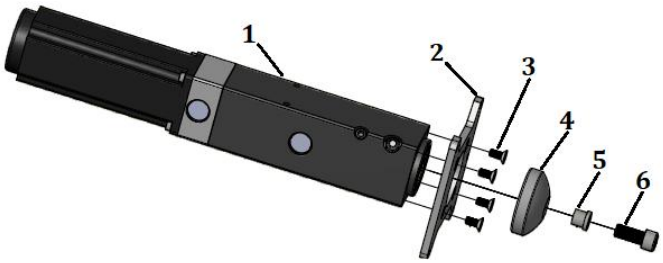
H-Bracket for 1.5 in HD Actuator - AC10

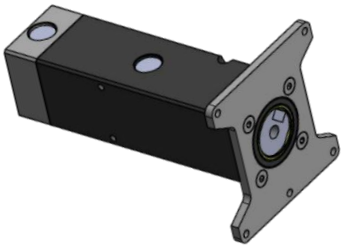


NOTE: Apply one drop of Loctite 243 blue thread locker on bolts (5), (7) and (9) before installation.

1. Align holes on H-plate (2) with holes on housing (1) and align holes on stop (3) with holes on H-plate (2), and then secure with lock washer (4) and bolt (5). Torque bolt (5) to 98 lbf.in.
2. Align holes on end piston adapter with holes on piston end and secure end piston adapter (6) with bolt (7). Torque bolt (7) to 40 lbf.in.
3. Secure pivot (8) on end piston (6) with bolt (9). Torque bolt (9) to 130 lbf.in.

H-Bracket for 3in Actuator - AC231





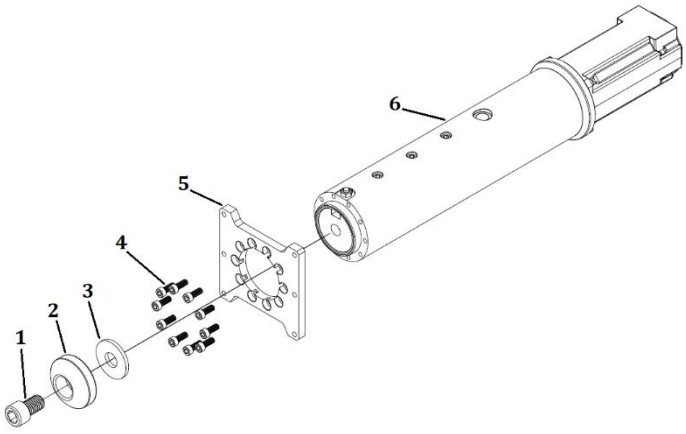
1. Place the H-bracket (3) on the end of the piston body (1) with the screw holes aligned.
2. Apply Loctite 243 (blue) thread locker in the four blind holes (2) on the piston body.

   NOTE: Apply the thread locker just before the bottom of the blind holes.

3. Use a 5 mm bit to secure the H-bracket plate to the piston body with 4 screws (item 4, M6 X 1.0 X 14 mm), then tighten the 4 screws to a torque of 133 N m (98 lbf in).
4. Install pivot (4) with spacer (5) and bolt (6).

H-Bracket for 6in actuator - AC360

NOTE: there are 2 models of H-brackets; one with seven mounting holes, one with 10 mounting holes. The procedures are the same for both models. Only the ten holes model is shown here.



1. Place the H-bracket (5) on the end of the piston body (6) with the screw holes aligned.
2. Apply Loctite 243 (blue) thread locker in the ten blind holes on the piston body (6).

   NOTE: Apply the thread locker just before the bottom of the blind holes.

3. Use a 5 mm bit to secure the H-bracket to the piston body with screws (item 4, M6 X 1.0 X 14 mm), then tighten the screws to a torque of 133 N m (98 lbf in).
4. Install pivot (2) with washer (3) and bolt (1).

9. Haptic system operation

Power on your haptic system. Actuators should do a homing sequence going all the way up, all the way down, and then center. This is a normal behavior.

You are now ready to live an immersive haptic experience!

10. Troubleshooting

This section contains step-by-step instructions to troubleshoot your G3 haptic system. If you need additional support, contact your reseller support team or the D-BOX Technical Support team if your system was bought directly from D-BOX.

10.1 Initial troubleshooting steps

STEP 1: Verify that the haptic system, KCU-1P and computer are powered on. If you see an orange or red light on the equipment, refer to the LED status tables below:

LED STATUS	STATUS	SOLUTION
Off	KCU-1P is not powered	Make sure the power supply is properly connected.
Red	No USB connection is detected	Check that the USB cable is properly connected. Make sure you have the latest version of HaptiSync Center installed. Make sure you are using the original USB cable provided with your controller.
Orange	Connected to the PC USB port. The unit is ready to operate.	Make sure the ACM Signal LED status for the MAIN IN is ''ON'', then start your D-BOX compatible software or game.
Green	The device is operational and receiving haptic data (or silence data).	

STEP 2: Verify that all ACMs are set to your country's voltage (**See section 5.2**).

STEP 3: Make sure your haptic system and KCU-1P Controller are connected to a grounded electrical outlet. If you must use an extension cable, use a 3-wire cable with properly grounded plugs. Do not connect to a circuit with a GFI breaker.

STEP 4: Check your haptic system's connection and make sure you are connected on the right ports. Then, verify that all termination loops are closed when applicable. The last MAIN ACM and SECONDARY ACM must be terminated with a shielded CAT.5e or 6 cable.

STEP 5: Make sure that all power and network cables are firmly plugged in. Always use the original USB cable supplied with the KCU-1P. Other USB cable might not be compatible. All network cables must be shielded CAT5e or 6. We strongly suggest using the network cables supplied with your haptic system.

STEP 6: Do a visual inspection of your system to make sure nothing prevents the haptic system from moving properly. Power cord(s) and network cable(s) must be secured and away from the actuators path.

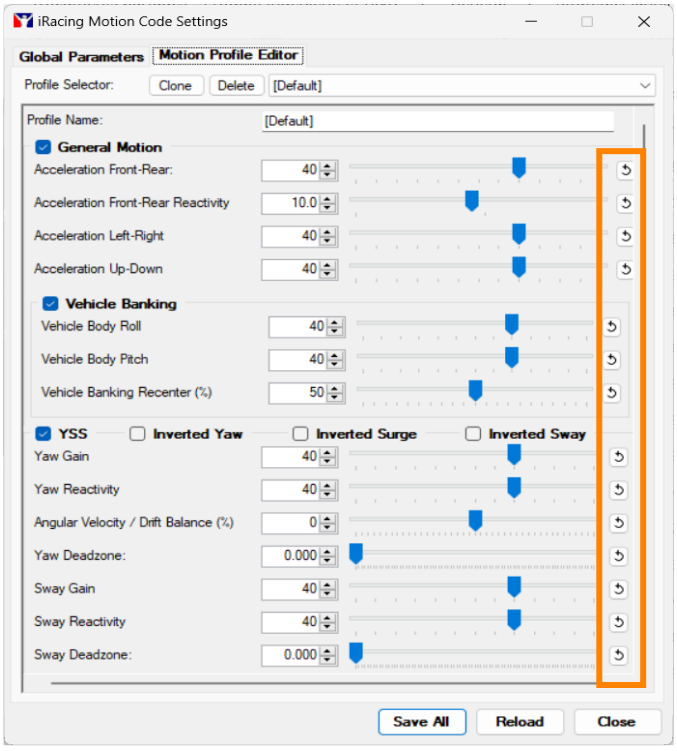
STEP 7: Validate your global settings in the Haptic Output section of D-BOX HaptiSync Center (Haptic Output section). Ensure haptic switch is set to ON and that your system is not muted.

10.2 Reinitiate your haptic system

STEP 8: Reset the entire system:

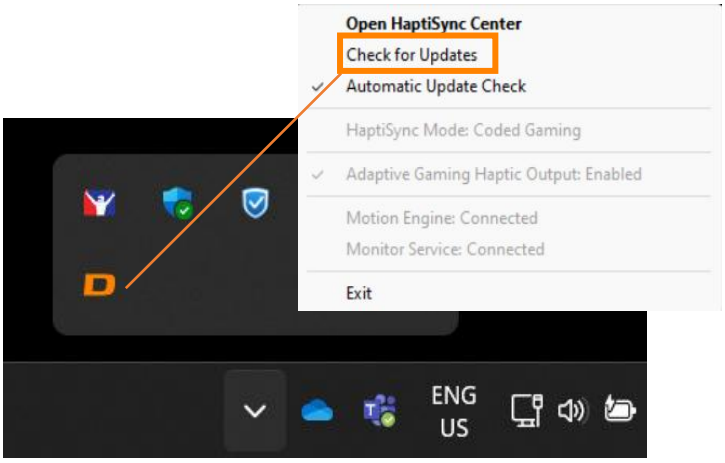
- Reboot your computer.
- Power off the haptic system and the KCU-1P Haptic Controller by unplugging the power cords. Wait for at least 60 seconds then restore the power to the equipment. The platform should do its homing sequence by going up, down then middle position. If the system does not go through its homing sequence, click **Monitoring & Diagnostics** in the **Haptic Output** Tab of the HaptiSync Center to open D-BOX System Monitor and check if there are some alarms. See **section 10** for faults and corrective actions.

STEP 9: Reset the specific motion code settings for the game you are using. If playing a game using the D-BOX Coded Gaming mode, select your game in the Library, click **Haptic Settings & Profile Selection**. In the new window, you will find the **Global Parameters** tab as well as the **Motion Profile Editor**. From the Motion Profile Editor tab, reset all the motion settings:



10.3 Update software and firmware

STEP 10: Make sure you have the latest version of the D-BOX HaptiSync Center installed on your computer. Click the ^ icon that is located to the left of the System Tray icons to open the expanded tray. Right click on the D-BOX icon then select **Check for Updates**:

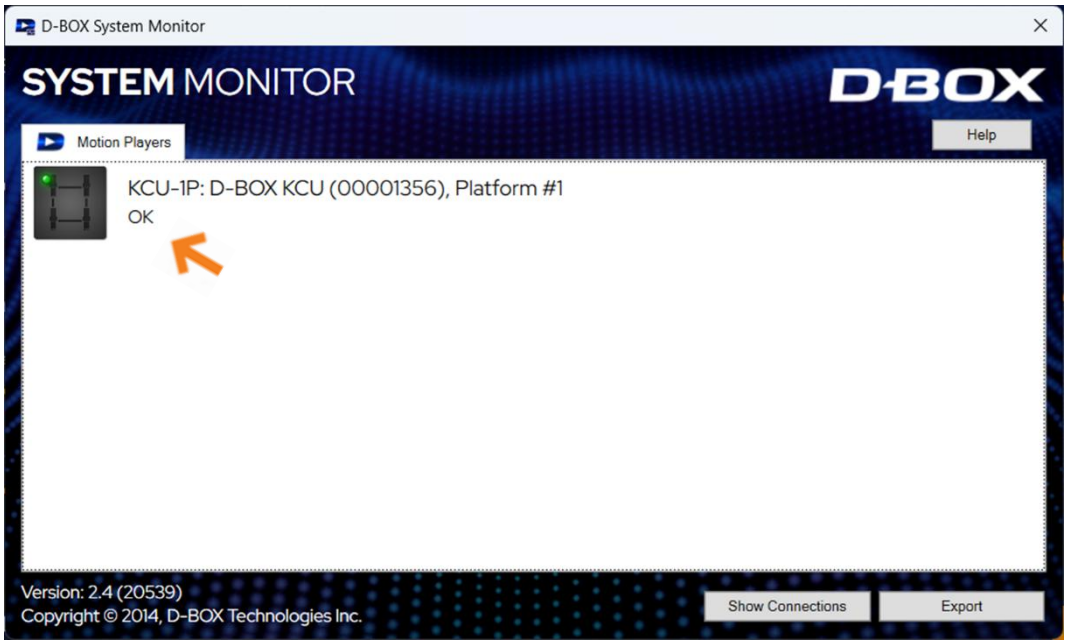


STEP 11: Ensure your firmware is up to date using the D-BOX System Configurator software (**see section 3.3**).

10.4 Troubleshooting with D-BOX System Monitor

The D-BOX System Monitor software is the right tool to test and diagnose your haptic system. The software is accessible by clicking 'Monitoring & Diagnostics' in the Haptic Output tab of the HaptiSync Center.

Once the window appears, click on the KCU device then a new window will open:



Overview Tab: The **Overview tab** displays a live overall 3D view of your D-BOX haptic platform and its current state. Actuators in a pending or alarm state are displayed as yellow or red:

The **Identify Actuators** button is used to start an interactive test to validate that all actuators are located as expected on the platform.

The **Test Platform** button is used to start a motion test on the selected platform. If multiple platforms are connected, all of them will receive the motion test.

The **Reset Platform** button is used to reset the D-BOX haptic system.

The **Rotate 180 degrees** button is used to change the orientation of the 3D view of the platform.

Connections Tab: The **Connections** tab lists the components of your platform. The status light is displayed as well as any active alarm:

Dots show the status of the D-BOX equipment.

Red dots indicate a failure.

Nodes description

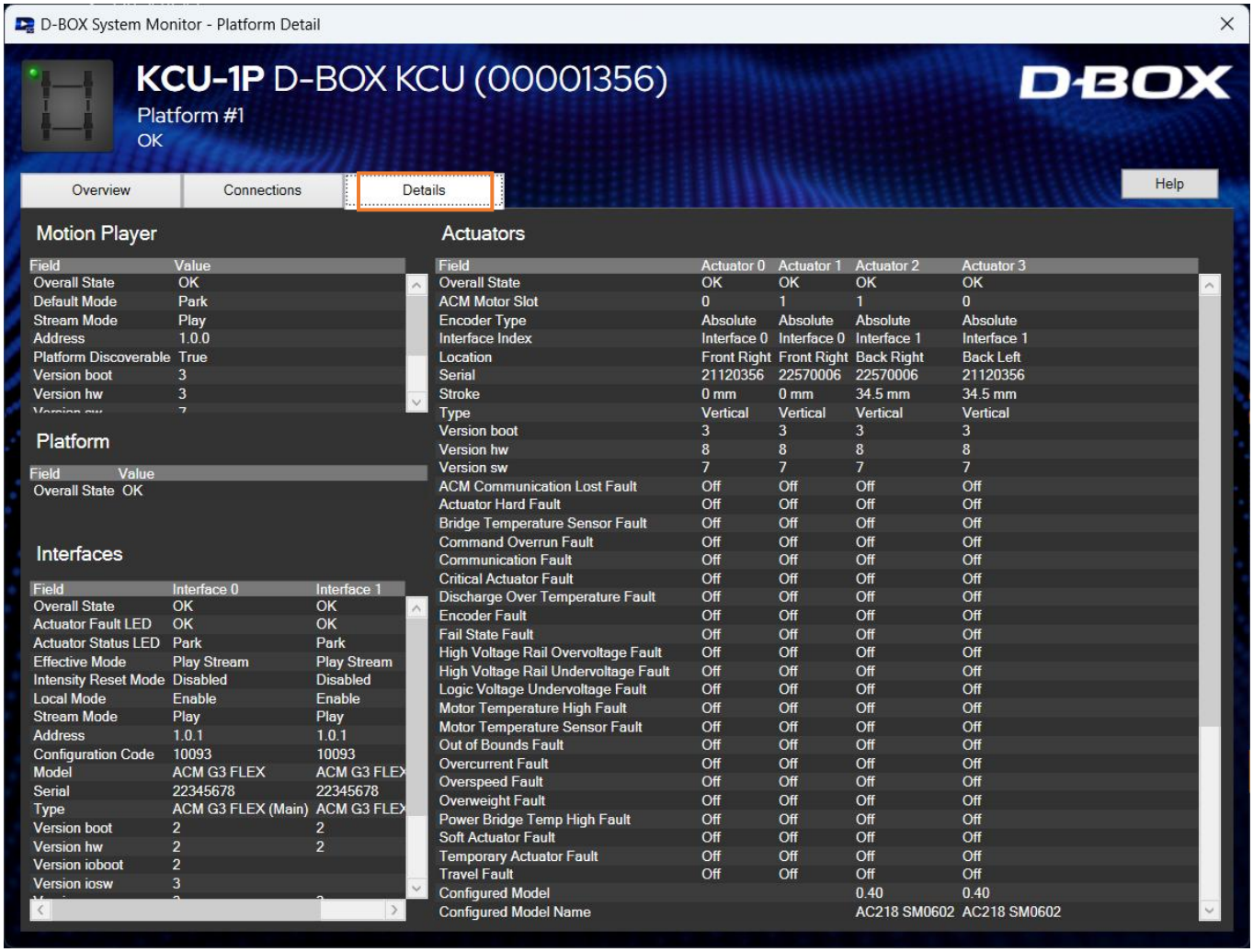
Motion Player: The Communication Unit connected to your computer.

Platform Index: Position of the platform connected, starting at 0.

Interface Index: ACM and actuators of your platform.

Alarm: Any alarm currently active (**see section 10 for details**).

Details Tab: The **Details** tab contains the complete technical details of the current D-BOX haptic system and can be used to further evaluate the status of each individual component (Motion Player/Communication Unit, ACM, and actuators):



10.5 Faults and corrective actions

Here is a list of the faults you can find in **Monitoring & Diagnostics** in the **Haptic Output** Tab, including the corrective actions:

FAULTS	CAUSES	CORRECTIVE ACTIONS
ACM Communication Lost Fault	Power and/or network cable is disconnected.	Make sure the power, USB and network (if applicable) cables are securely plugged in. Visually inspect the entire length of the network cable for obvious signs of damage. Make sure your ACM is connected to a grounded electrical outlet. Do not use adapter plugs or remove the grounding prong from cables. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.
Actuator Hard Fault	This is a Hard fault. The faulty actuator is immediately deactivated, and all other actuators go to their lowest position.	Do a visual inspection to make sure nothing is blocking the travel of the actuator. Power off the haptic system, support your platform to gain access to the actuator piston and pull it out of its body slowly until the entire piston is out of the body and than slowly push it back in. If the error persists, replace/repair the faulty actuator.
Bridge Temperature Sensor Fault	The error can be triggered by starting the haptic system when the temperature is too low. The internal power bridge sensor is defective.	Make sure your haptic system is running in a temperature range between 0 to 40°C. Make sure there is enough ventilation around the actuator. If the problem persists, replace/repair the faulty actuator.
Command Overrun Fault	A new command was received by the actuator while the previous command was not completed. This should not be a permanent fault and should be cleared after a while.	In D-BOX System Monitor, reset your haptic system (Reset Platform). Power off the haptic system, wait for a minute, then try again. In D-BOX System Monitor, check if there is any other fault and follow the recommended solution. If the error persists, contact your reseller support team or D-BOX Technical Support if your system was purchased directly from D-BOX.

FAULTS	CAUSES	CORRECTIVE ACTIONS
Critical Actuator Fault	This is a hard fault. The faulty actuator is immediately deactivated to prevent damage, and all other actuators go to the lowest position.	Do a visual inspection to make sure nothing is blocking the travel of the actuator. Power off the haptic system, support your platform to gain access to the actuator piston and pull it out of its body slowly until the entire piston is out of the body and than slowly push it back in. If the error persists, replace/repair the faulty actuator.
Encoder Fault	There is a problem associated to the motor encoder.	Power off the haptic system, wait for a minute, then try again. If the error persists, replace/repair the faulty actuator.
High Voltage Rail Overvoltage Fault	Too high voltage detected. Voltage from the wall outlet is too high for the haptic system.	Verify that all actuators are set to your region power voltage (**see section 5.2**). Make sure you are not connected to a GFI breaker. Check the power coming out of the outlet and make sure it respects the specified operating conditions. In case of doubt, connect the haptic system to another circuit. Visually inspect the entire length of the power cable for obvious signs of damage. Make sure you are connected to a grounded electrical outlet. Do not use adapter plugs or remove the grounding prong from cables. If you must use an extension cable, use a 3-wire cable with properly grounded plugs. If you are using an extension cable, try without. If the error persists, replace/repair the faulty actuator.
High Voltage Rail Undervoltage Fault	Too low voltage detected. Voltage from the wall outlet is too low for the haptic system.	
Logic Voltage Undervoltage Fault	Low-voltage rail is too low.	
Motor Temperature High Fault	The motor temperature detector has failed or disconnected, or that the temperature is too low.	Make sure that the weight on the platform is not heavier than the maximum supported weight.

FAULTS	CAUSES	CORRECTIVE ACTIONS
Motor Temperature Sensor Fault	If the temperature shown is around 561 degrees, it may be a defective motor cable or temperature sensor.	Make sure that the weight is evenly distributed among the actuators of the platform (as centered as possible). In D-BOX System Monitor, weight limits in "D-BOX Newton" should we lower than what is identified in **section 6**. Make sure the haptic system is operating in normal operating conditions (room temperature). If the error persists, replace/repair the faulty actuator.
Out of bounds Fault	The position of the actuator is over its limits. Should never occur in normal operation conditions. Might comes from haptic code.	Verify that you are running a D-BOX certified haptic code. Call D-BOX Technical Support for validation if necessary. Perform a test using the 'Start System Test' in the HaptiSync Center.
Overcurrent Fault	Actuator might have the wrong configuration (ex: 250lbs motor instead of 400lbs).	Make sure you have the right configuration using the D-BOX System Configurator (**see section 3.3**). If the error persists, contact your reseller support team or D-BOX Technical Support if your system was purchased directly from D-BOX.
Overweight Fault	There is too much weight on the platform. The weight is unbalanced on the platform.	Make sure that the weight on the platform is not heavier than the maximum supported weight. Make sure that the weight is evenly distributed among the actuators of the platform (as centered as possible). In D-BOX System Monitor, weight limits in "D-BOX Newton" should we lower than what is identified in **section 6**. If the error persists, contact your reseller support team or D-BOX Technical Support if your system was purchased directly from D-BOX.

FAULTS	CAUSES	CORRECTIVE ACTIONS
Power Bridge Temperature High	The actuator power bridge has overheated, or the sensor is defective.	Remove the power, wait for a minute then try again. Let the system cool down for a while and see if the temperature cools within normal limits. If the error persists, contact your reseller support team or D-BOX Technical Support if your system was purchased directly from D-BOX.
Soft Actuator Fault	This fault is always accompanied with another fault (called ''main fault'').	Check solution for the main fault.
Temporary Actuator Fault	This fault is always accompanied with another fault (called ''main fault'').	Check solution for the main fault.
Travel Fault	The travel measure during the search-stop procedure is too large or too small. An external body preventing the actuator to move. A defective actuator. A bad communication with encoder.	Do a visual inspection to make sure nothing is blocking the actuator travel. Power off the haptic system, support the platform to gain access to the actuator piston and pull it out of its body slowly until the entire piston is out of the body and than slowly push it back in. If the error persists, replace/repair the faulty actuator.

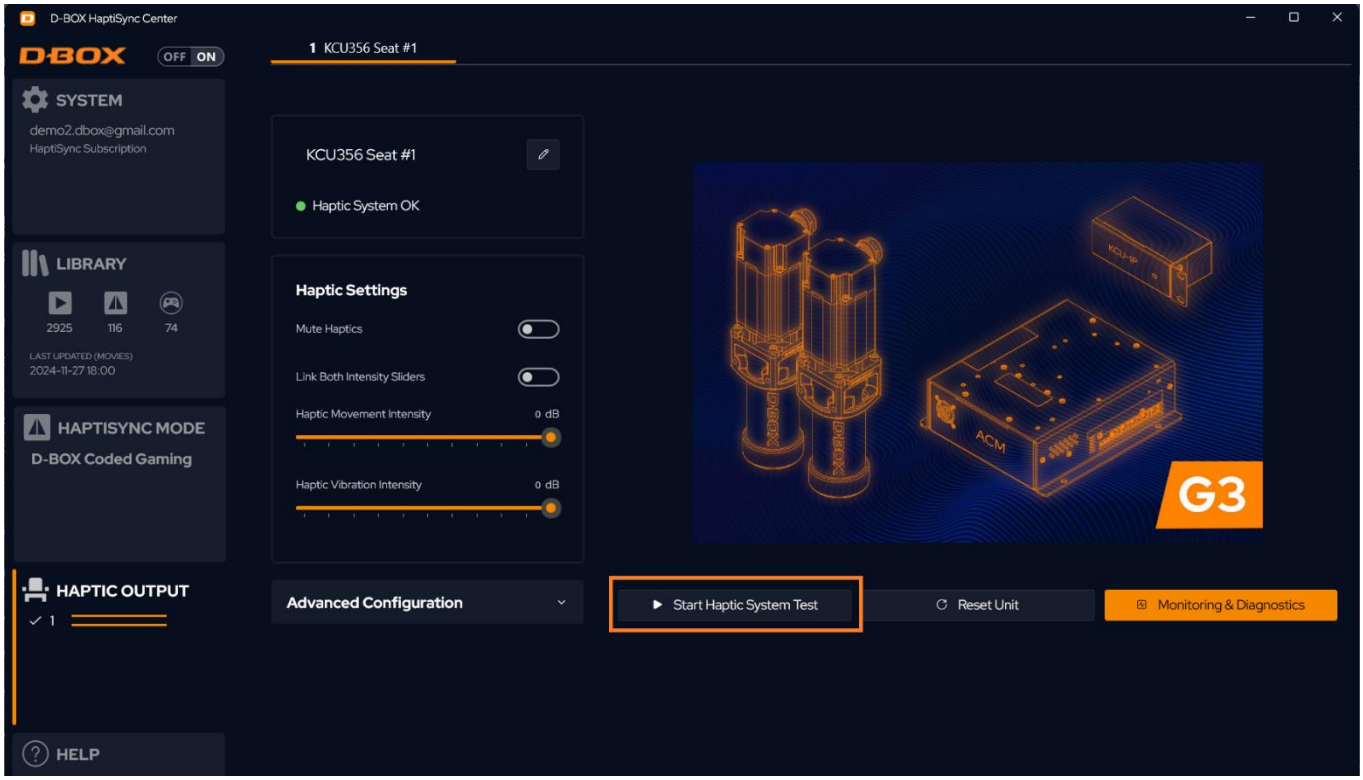
10.6 Troubleshooting Software Issues (HaptiSync Center)

This section covers a step-by-step approach to help you fix issues related to the software or haptic code.

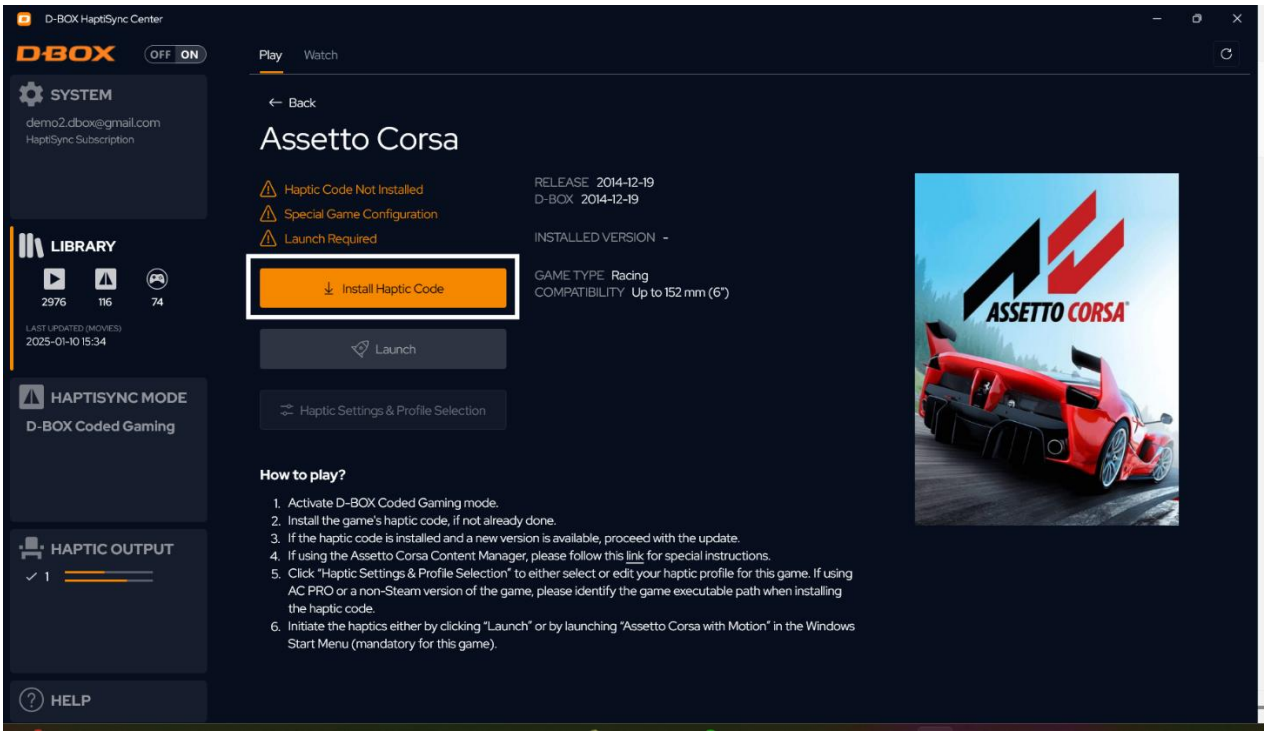
STEP 1: Make sure you are using the latest version of D-BOX HaptiSync Center (see **section 3.2**).

STEP 2: Make sure that your HaptiSync Mode is set to **D-BOX Coded Gaming.**

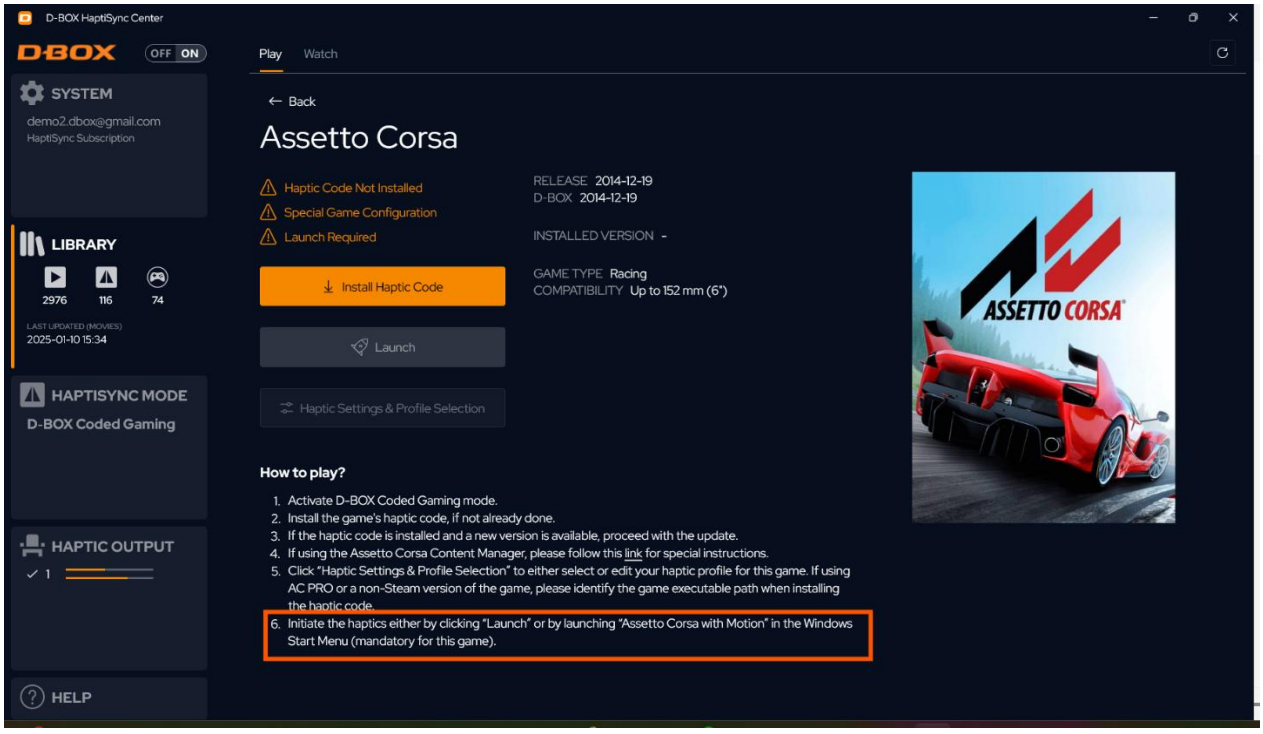
STEP 3: Proceed with a motion & communication test by clicking **Start Haptic System Test** in the Haptic Output section of the HaptiSync Center.



STEP 4: Make sure you have the latest version of the haptic code installed. If there is a newer version available, click **Update Haptic Code**:



STEP 5: Make sure to launch the game from the D-BOX HaptiSync Center. Select the game then click the **Launch** button at the bottom. Some games may need to be launched in a specific way. Read the detailed instructions:



Annex 1 - Information for commercial use

This information is intended for integrators who use G3 haptic system in an integrated solution. It is not applicable if the system is used for personal applications (sim racing, home entertainment, etc.)

Mechanical integration

Here is a checklist to complete your mechanical integration phase:

- Consult all relevant documentation: Installation guides contain important information on how to integrate and use our products. Make sure to respect all specifications and guidelines. This will help keep your product healthy and optimize its service lifetime. Most of our guides are available through our website but please do not hesitate to contact our team if you cannot find the information you are looking for.
- Share your design with us for review and recommendations: Once your CAD integration is completed, our team will validate that the design respects our guidelines. All D-BOX products 3D files are available in .stp format upon request.
- Complete a finite element analysis (FEA): Once the design is final, the FEA highlights potential design flaws and ensures the service lifetime is per your requirements.
- Complete life cycle tests with proper load and waves: Life cycle tests using D-BOX haptic codes are representative of typical usage.

Software integration

Here is a checklist to complete your software integration phase:

- Complete the step as described in section 2 of this document:
    - **Set up your D-BOX Connect account**: D-BOX Connect is used for haptic codes distribution and authorization service. This is mandatory to install and update haptic codes for D-BOX Coded games and have access to haptic codes for D-BOX Coded movies and series.
    - Download and install **D-BOX HaptiSync Center** software suite available on our website.
    - Download, extract and install the **D-BOX System Configurator**, also available on our website.
- **Integrate the monitoring and diagnostics API** available on our website. This application provides live health and operational data for the haptic system. Default TCP communication port is 40001, but this value can be modified with the configuration file. Internal polling interval is 100ms so your application should poll at an equal or slower rate.

Haptic code integration

D-BOX haptic codes are readily compatible for many contents (2D, 3D, linear, interactive). Details can be found in the HaptiSync Center.

However, should you need a custom haptic code for linear content (clip, movie, etc.), our team can create custom haptic codes for your specific needs.

- **Send us your preliminary assets for evaluation:** our team will evaluate the time required for the creation of the haptic code. We will also provide recommendations to improve the global experience if possible.
- **Send us final assets with your directives**: our team will go through the creation process and send you the necessary files in the correct format.
- **Test the experience and send us your comments**: if you feel like the experience needs to be improved.

Our team of haptic designers have experience creating haptic codes for all sorts of contents. They will be helpful in the creation of an amazing experience. There are no autonomous methods of creating haptic codes.

If you need a custom haptic code for an interactive content, refer to the following instructions:

- **Integrate the D-BOX Live Motion SDK in your software:** Live Motion SDK allows you to submit live events that are processed by the matching haptic code and turned into a corresponding immersive haptic signal. Our SDK is well documented and available upon request.
- **Send us logs and videos** for us to start the haptic code creation process: Our team would rather work with the real assets, but we understand this might be complex to achieve. The description of the required logs and video will be shared with you before the beginning of the process.
- **Test the experience and send us your comments:** for iteration if you feel like the experience needs to be improved. Our team will also send you recommendations to improve the overall experience and will support the iteration until both parties are satisfied with the or.

Note: D-BOX haptic integrators have experience creating haptic codes for various contents. Working with us will allow an optimal experience. However, we offer different integration methods if you have a need for more autonomy. Contact our sales team for details.

Annex 2 – G3 haptic system using older ACM versions (ACM G3 or ACM G2)

There is 2 type of ACM G3:

ACM G3	TRAVEL	MODEL	MAX NUMBER OF ACTUATORS PER ACM
ACM G3 w DISCHARGE MAIN, SECONDARY	1.5 in	250i	2
		400i	
		250HD	
		400HD	
	3 in	250i-3	2
		400i-3	
ACM G3 w DISCHARGE & FAN MAIN, SECONDARY	6 in	500HD	2

Compatibility:

- ACM G3 FLEX is compatible with ACM G3 or ACM G2 but the ACM G3 FLEX must be the MAIN ACM in the haptic system. ACM G3 FLEX is not compatible with ACM G1
- ACM G3 is compatible with ACM G2. ACM G3 is not compatible with G1.

It is also important to note that:

- ACMs are programmed to work with a specific actuator model and at a specific place in the architecture (Main/Secondary). Thus, ACMs are not interchangeable but can be reconfigured using D-BOX System Configurator.
- In the G3 architecture, the ACMs are only compatible with a G3 actuator (motor and mechanics). Different generations of components are not compatible with each other.

Connecting a G3 haptic system with ACM G3

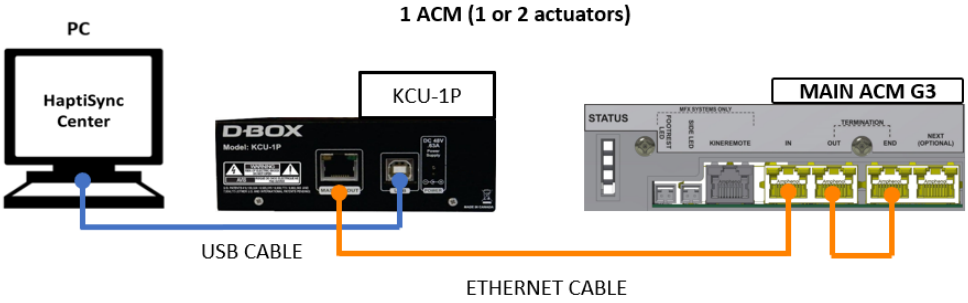
Depending on the ACM position in the system, it is programmed either as:

- **MAIN:** first ACM in a haptic system
- **SECONDARY:** all following ACMs

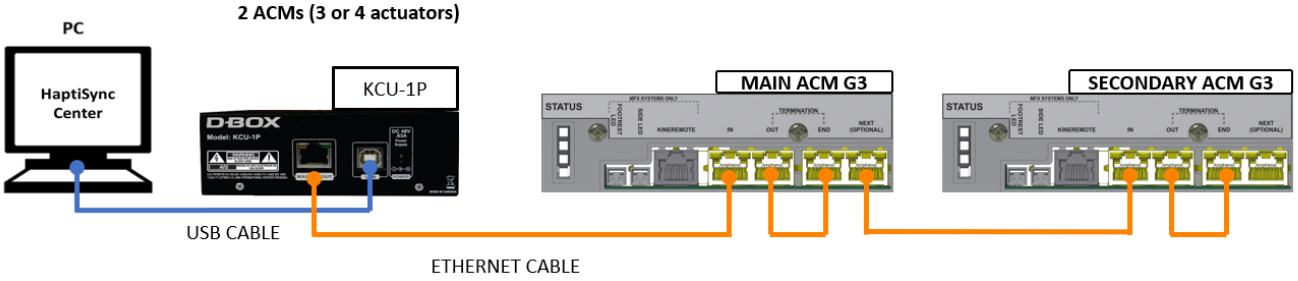
The last MAIN and SECONDARY ACM(s) in the chain must always be terminated using a 1-foot shielded CAT5e cable, connecting from OUT to END ports of ACM.

Here are typical ACM configurations for the connection of a single haptic system:

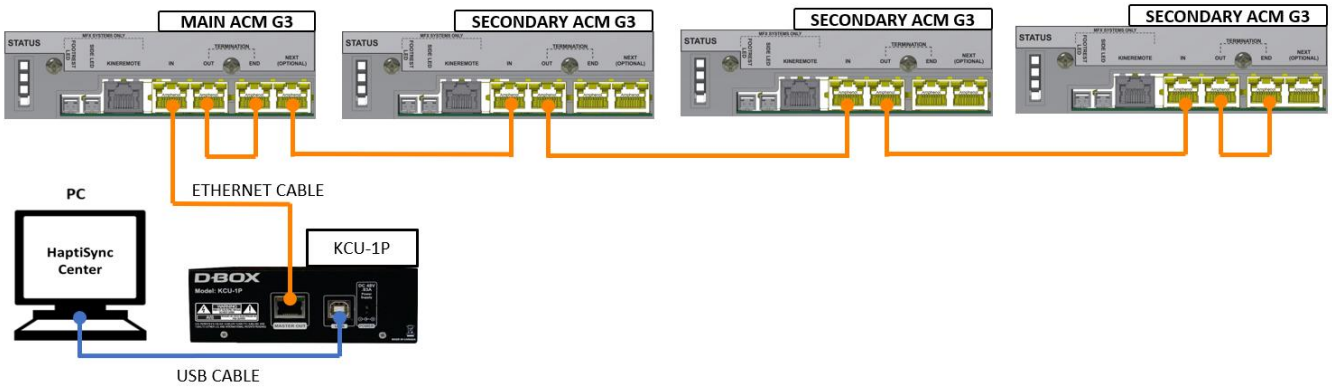
1 ACM (1 or 2 actuators)



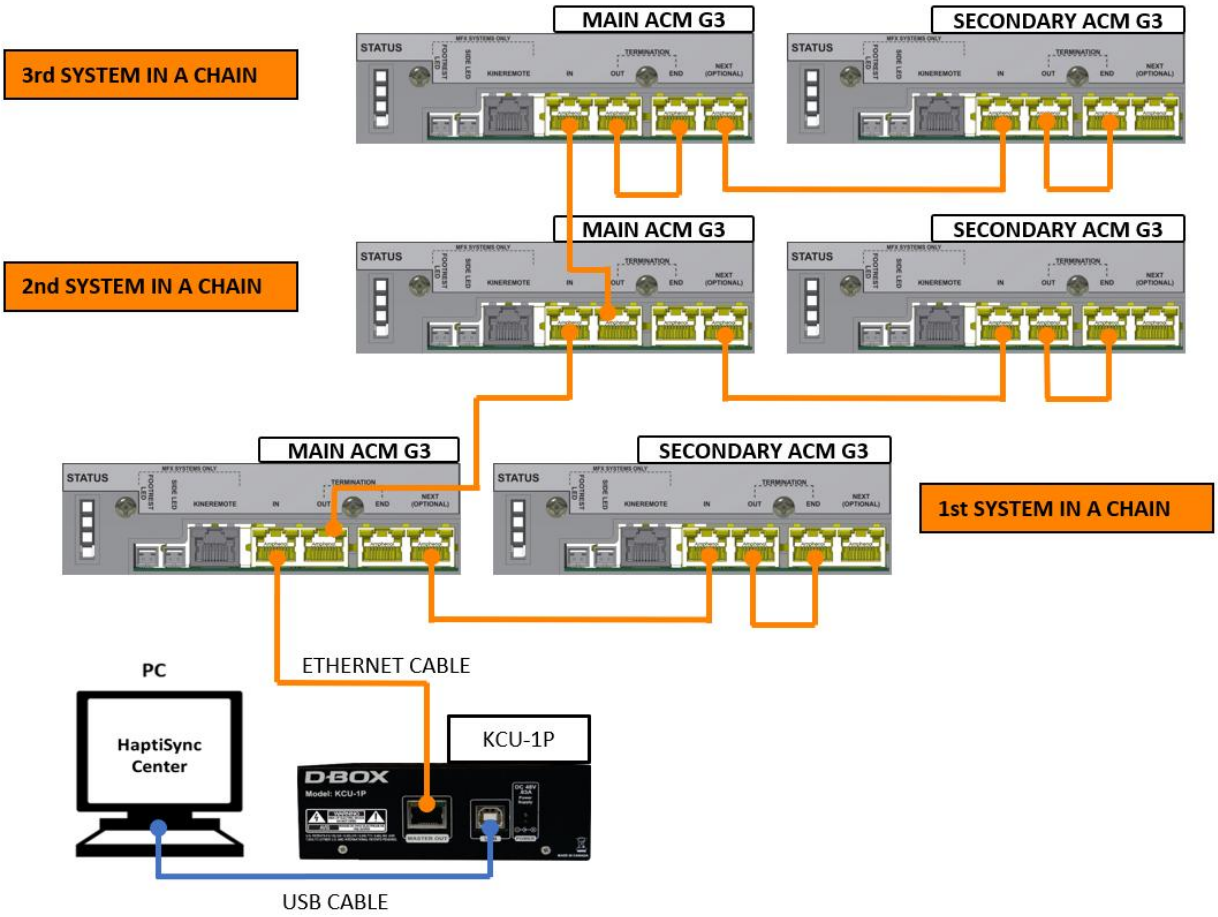
2 ACMs (3 or 4 actuators)



4 ACMs (7 or 8 actuators)

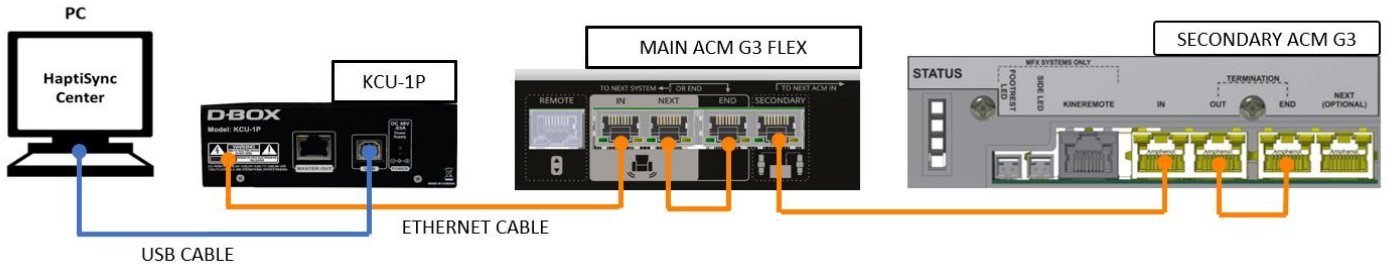


The following example shows 3 D-BOX haptic systems using 2 ACMs each. In this case, the 3 systems are daisy-chained.



Connecting a G3 haptic system with both ACM G3 and ACM G3 FLEX

If you are connecting a SECONDARY G3 FLEX ACM to a G3 haptic system that has already ACM G3, please refer to this diagram:



IMPORTANT: Only a MAIN G3 ACM can be replaced by an ACM G3 FLEX.

Connecting a G3 haptic system with ACM G3 and ACM G2

ACM G3 is compatible with ACM G2. The ACM G2 can be configured either as a MAIN or a SECONDARY ACM.

If you are connecting a SECONDARY ACM G2 to a G3 haptic system, please refer to the diagram below and note the following:

- You will be able to use the D-BOX System Configurator to change the configuration however, you will not be able to change the actuator type or reorder the ACMs.
- When contacting your reseller support team or D-BOX Technical Support, please make sure to mention your architecture is composed of a mix of both generations.