

INNOVATIVE MOTION
DEFINED

EN

USER MANUAL



QS CH2

The Motion Systems, manufacturer of Qubic System, would like to thank you for choosing the QS-CH2, an innovative product that helps you to develop highly reliable training and entertainment solutions that reproduce key immersive elements, such as surface textures, acceleration, engine vibrations and vehicle dynamics for multiple types of land, air or sea vehicles. Our motion system has been designed to deliver the most realistic simulation experience. We hope you enjoy your new Qubic System!

Our experts are ready to assist you:
QubicSystem.com/contact



ASK SUPPORT

Our experts are ready to assist you:
MotionSystems.eu/Support



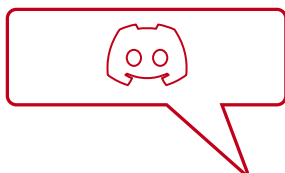
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1. SAFETY PRECAUTIONS

Read all safety instructions before installing and using this product. Save this document for future reference. If ownership of this product is transferred, be sure to include this manual.

Following coloured frames are used in this manual to draw attention to important information or warnings:

INFO

The instructions included in this frame indicate information that is considered important, but not injury- or damage-related.

WARNING

The instructions included in this frame indicate a dangerous situation that, if not avoided, could result in a user injury or device damage.

1.1. GENERAL SAFETY

WARNING



Keep hands and feet away from the moving parts when device is in motion.

WARNING



Always ensure that cockpit attachment points can withstand forces generated by the QS-CH2 (approved construction or tested for expected load). Check the cockpit for loose mounting points.

WARNING



To reduce the risk of burns, fire, electrical shock, injury or mechanical damage always **TURN OFF THE POWER SUPPLY** before plugging and unplugging the QS-CH2.

Dangerous voltages level can be present in Power Cabinet for a few minutes after turning off the machine.

WARNING



The device is intended solely for individuals **OVER THE AGE OF 16**. In case of use by individuals with limited physical, sensory, or mental capabilities, strict supervision is required. Read safety instructions before using the device.

- Use the QS-CH2 only for its intended purpose, according to instructions.
- Unplug the QS-CH2 from the power supply if it is not used for an extended period of time or when there is a need to perform hardware installation, maintenance, service or repair.
- Turn off the QS-CH2 when it is not in use.
- The QS-CH2 was designed for indoor use only - **DO NOT** store or use the product outdoors.
- Keep the QS-CH2 away from heat sources, high humidity, water, and other liquids. **DO NOT** store in places where water vapor condensation may occur due to low temperatures.
- **DO NOT** disassemble the Power Cabinets or actuators. Any tampering with or altering the product will void the warranty, pose a serious risk of electric shock, and may irreparably damage the product.
- If the device starts emitting unusual noises, smoke, or indicating that the device is not working properly, **STOP** using the QS-CH2 immediately and contact technical support.
- **DO NOT** cover the ventilation holes in the device.
- Keep the power cord plug and the socket dry, clean and dust-free.
- Protect the power cord from being damaged by being stepped on, rubbed against, or pinched.
- **DO NOT** use the QS-CH2 if the ambient temperature is below 5°C (41°F) or above 40°C (104°F).
- **DO NOT** use the QS-CH2 if it has been damaged, or any component is broken or missing. Please contact technical support.
- **DO NOT** use attachments or replacement parts not recommended or approved by the manufacturer. If you must replace a damaged power cord, use only certified products with the same rating as the one being replaced.
- Connect the QS-CH2 to a correctly grounded outlet only.
- If you want to increase safety level of the system, you can add external safety devices. For detailed information check section 6 on page 44.
- Use only certified components and fasteners when installing seat, seat belts and other accessories to QS-CH2.

WARNING

Stop using the QS-CH2 immediately and contact technical support when the machine starts to emit unusual noise, smoke or any other suspicious behavior indicating the machine is not working properly.

1.2. HEALTH AND SAFETY INSTRUCTION

The safety of Qubic System users is the top priority. To protect users and bystanders against injuries caused by mechanical parts movement and electrical connectivity, the following instructions must be strictly performed.

WARNING

As with any mechanical device, the user is responsible for inspecting the condition of the machine prior to use and adhering to safe operating procedures.

Even though possibilities with QS-CH2 are broad, some things should be kept in mind when the place for the rig is chosen. Motion Systems **DOES NOT** approve exceeding or ignoring any of these points and **IS NOT** responsible for malfunctions or failures that, are the results of these actions.

- **DO NOT** use the QS-CH2 on very soft or fragile surfaces like rubber, glass, or foam.
- Ensure that all QS-CH2 modules are mounted properly.
- Be aware that without anchoring QS-CH2 will crawl a little in every direction during operation. Those movements could damage the surface in the long term. Manufacturer, its subsidiaries, and their partners are not responsible for any floor damages.
- **DO NOT** mount the rig in tight or cluttered spaces – remember that QS-CH2 moves and nothing should restrict its motion range.
- Seatbelts and other harnesses should be mounted to parts of the motion rig that move in the same way as the seat. **DO NOT** attach them to any static part or ground.
- Cables must not be stretched and should be kept in a way that prevents them from getting under actuator or any part that can crush or tear them.
- If you want to use the QS-CH2 in an unusual application, and you are not sure, that the desired setup is feasible, please contact, the distributor/reseller.

What must be checked before turning on the device:

- Check if cables are mounted properly – they are not stretched or loosely connected to the socket.
- Check if there are no objects in the motion range of the platform.
- Check that all elements are properly fixed.
- Check if there are no sharp edges nearby.
- Check if everyone around is aware of machine rapid movements.
- Make sure that no one stands in the range of motion (minimum 1.5 m).
- Motion Lock Switch should be mounted close to the operator or user of the machine – it has to be easily reachable in every situation.
- Check Motion Lock Switch **AT LEAST** once a month to reduce the possibility of unknown failure – more information available in chapter 4 on page 36.

How to safely turn on and use the QS-CH2:

- When the QS-CH2 is turned on, it requires Motion Lock button cycle and then performs a start-up calibration. For details go to section **2.9** on page **11**.

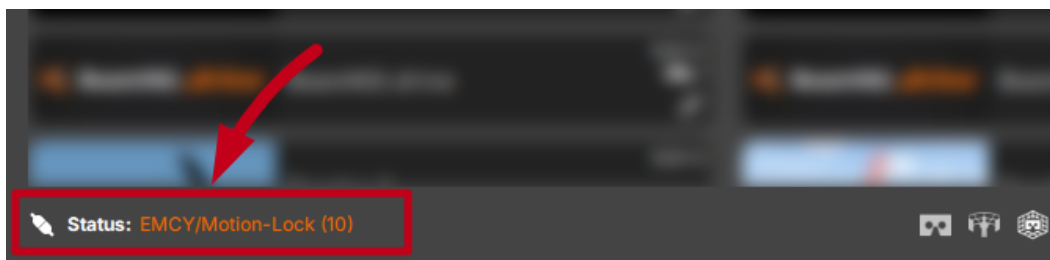
WARNING

In order to perform a calibration, QS-CH2 will move after turning the power on and cycling the Motion Lock button. Stay in the safe distance from that movement and do not try to interrupt it.

- **DO NOT** interrupt or change the weight of payload mounted to the QS-CH2 during start-up calibration.
- Before getting on or off the machine **ALWAYS** activate Motion Lock (press the red button)
- In case of game crash or freeze, the Motion Lock Switch must be pressed before getting off the machine.

INFO

To check if the QS-CH2 is in the Motion Lock mode - go to QubicManager application main window. Platform status is displayed in the lower left corner of the main application window. Motion Lock engaged:



INFO

Motion Lock input is not SIL/PL (safety integrity level/performance level) rated and **DOES NOT** guarantee safety. If you wish to achieve specific SIL/PL ranking, consider introducing a power cut-off device that is controlled by an external safety relay and cuts off the power to all Power Cabinets. Example application of the power cut-off contactor can be found in section **6.3.2** and **6.3.3** on pages **48** and **50**.

WARNING



Dangerous voltage level are present in the Power Cabinet and cables during the operation and for up to a few minutes after turning off the machine.

- For VR Headset users:
 - Remove the VR goggles before entering or exiting the rig.
 - Ensure that VR Headset is not limiting the operation range of QS-CH2.
 - Check if the whole VR setup is not in range of motion of the machine.
 - **DO NOT** place the connection loosely under the motion rig.

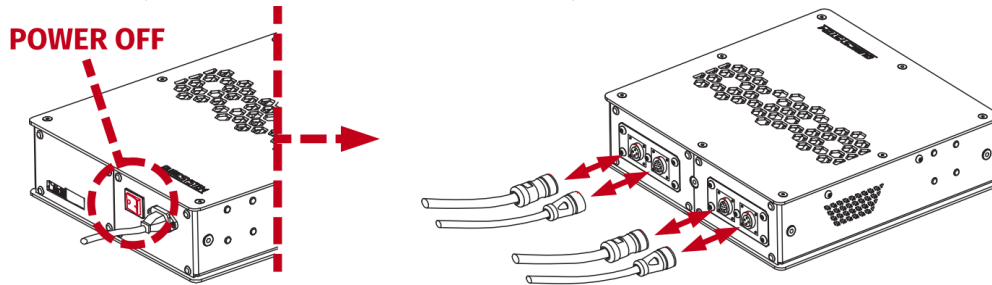
INFO

It is **recommended** that the connected PC is capable of running the game at stable 90 frames per second or more when VR Headset is used. Lower values can cause VR sickness.

- **DO NOT** use QS-CH2 if you are pregnant, tired, or under the influence of alcohol or drugs.
- **STOP USING** the QS-CH2 immediately if pain, fatigue or any discomfort appears.
- For every two hours of using the system, we recommend at least **15 MINUTES OF BREAK**.
- **DO NOT** put your hands or legs in the actuators range of motion!
- **DO NOT** use the QS-CH2 around small children or pets.
- **DO NOT** put any items between actuators and stabilization plates.
- **DO NOT** pull the wires connecting the actuators with the power cabinets.

WARNING

In case of any service operations - plugging and unplugging the actuator must **ALWAYS** be performed with Power Cabinet's power switched OFF.

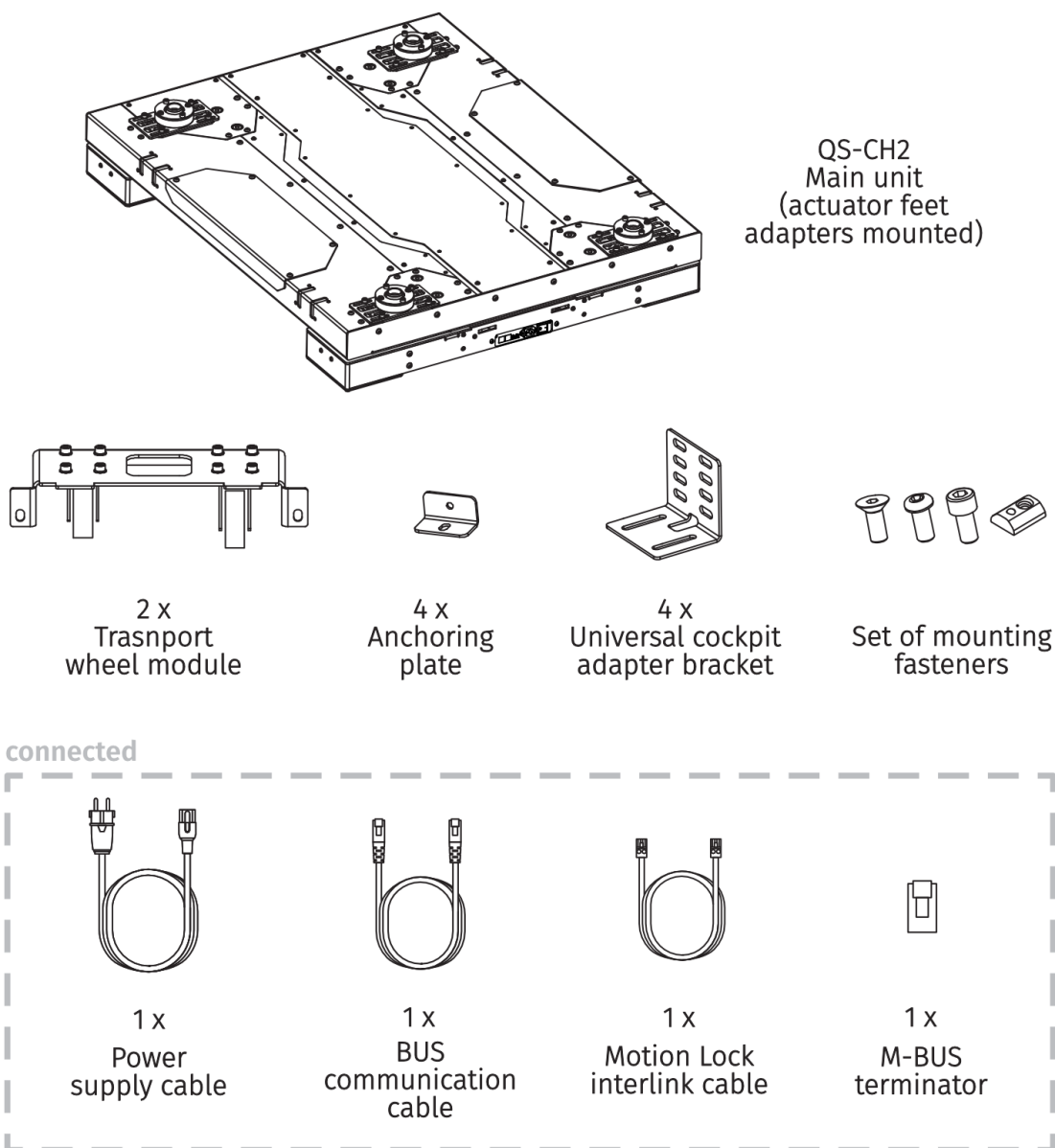


Always make sure that all PUSH-PULL connectors are plugged **all the way in** - ring lock **MUST** click into place. Loose connections may result in serious actuator damage.

2. TECHNICAL DETAILS

QS-CH2 is 2DoF (Degree of Freedom) motion platform delivering **SURGE** and **YAW** movements. It is dedicated for car driving simulations and flying simulators. It utilizes two longitudinal linear motion actuators with dedicated a Power Cabinet under the floor to replicate longitudinal and lateral acceleration. It perfectly replicates oversteer and acceleration/braking effects. Full system only requires 1.5 square meters of space.

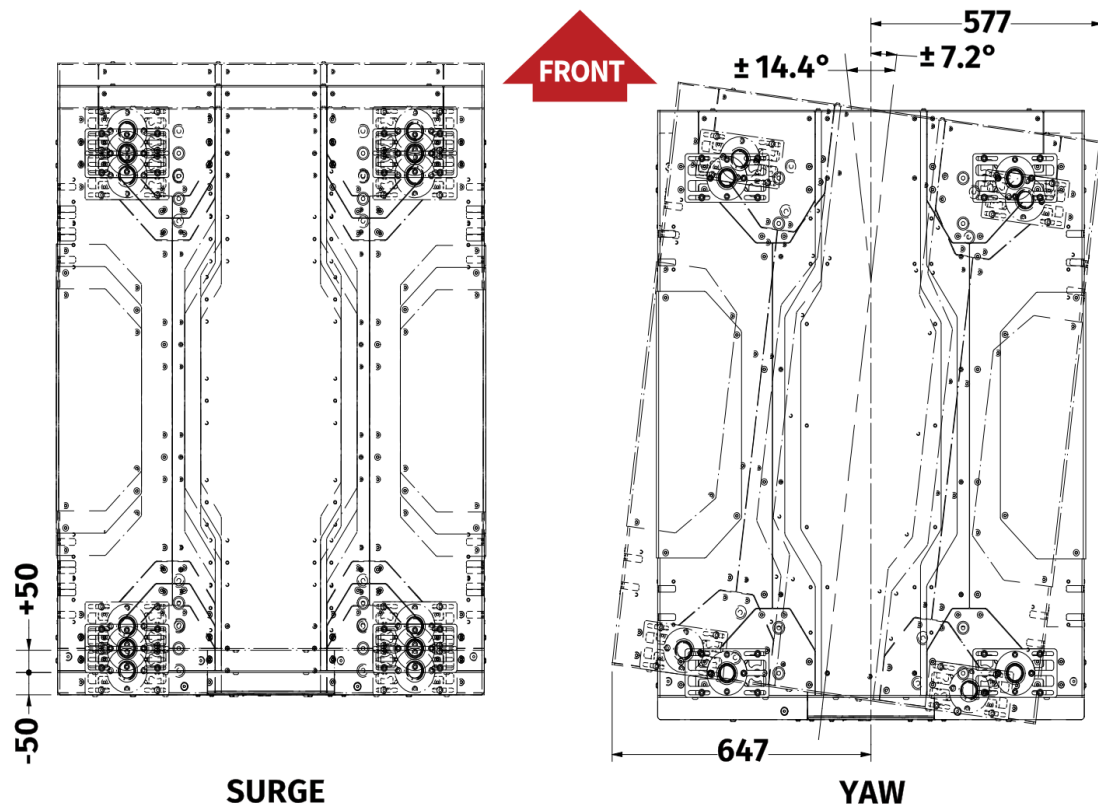
2.1. SYSTEM COMPONENTS



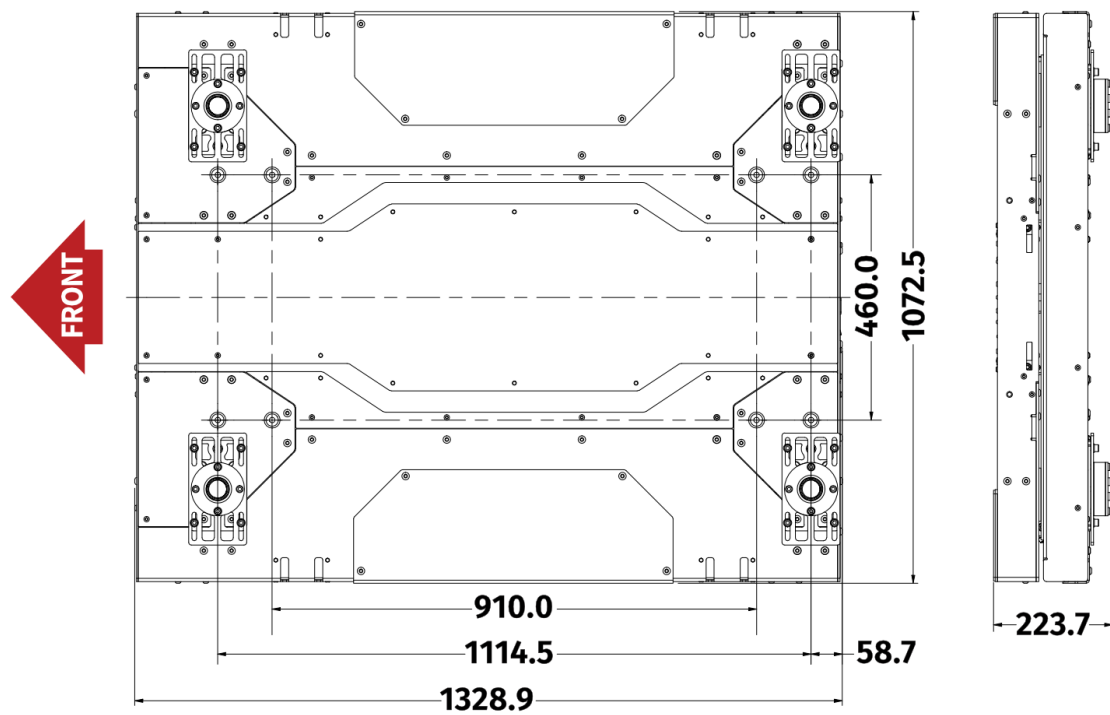
INFO

If you are running QS-CH2 as a single device: QS-MC6 set (including M10 controller and Motion Lock button) is required. It is not included in a QS-CH2 set and has to be purchased separately.

2.2. EXCURSIONS



2.3. DIMENSIONS



2.4. SYSTEM SPECIFICATION

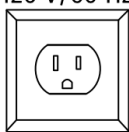
Specification		
Architecture		2DOF
Actuator stroke		100 mm
Platform weight		160 kg
Gross moving load		300 kg
Excursions		
Yaw		-7.2° , 7.2°
Surge		-50 mm , 50 mm
Performance		
Motion	Velocity	Acceleration
Yaw	70° /s	1500° /s²
Surge	450 mm/s	0.56G

*Value of acceleration is limited for safety reasons.

2.5. POWER REQUIREMENTS

QS-CH2 requires a 120/230±10% VAC 50-60 Hz single phase with ground and neutral connection.

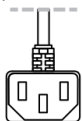
USA/CAN
120 V/60 Hz



Type B plug
Nema 5-15p

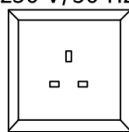


Rated for
125V/15A
3x 2.08 mm²
(14AWG)

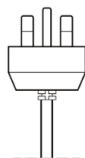


C13 IEC-60320

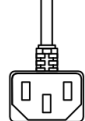
UK
230 V/50 Hz



Type G plug
BS 1363 P3

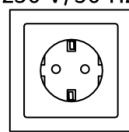


Rated for
250V/10A
3x 0.75 mm²

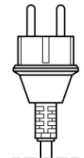


C13 IEC-60320

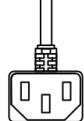
EU
230 V/50 Hz



Type F plug
CEE 7/7

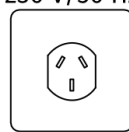


Rated for
230V/10A
3x 0.75 mm²

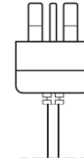


C13 IEC-60320

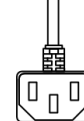
AU
230 V/50 Hz



Type I plug
AS/NZS-3112-1



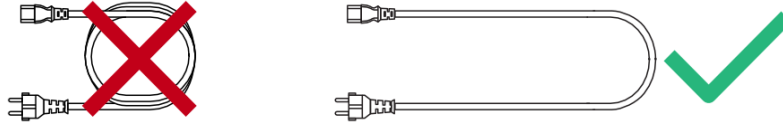
Rated for
230V/10A
3x 18 AWG



C13 IEC-60320

INFO

Always **UNWIND THE CABLE COMPLETELY** when using a cable reel and untangle an extension cord before connecting the device to the power supply.



WARNING

- The device is **NOT** intended to be used in an IT earthing/grounding system.
- The product must be connected to the mains power supply with a protective earth (**PE**) and a residual current circuit breaker (**RCCB**).

If you experience issues such as unexpected shutdowns or resets during simulation, it is recommended to inspect the power cables and power source. The use of cables that do not meet the specified requirements may lead to malfunctions. To ensure proper device operation, replace any non-compliant cables with ones that meet the required specifications.

2.6. POWER CONSUMPTION

Table below contains power consumption data for QS-CH2 measured with a 200 kg payload:

Converter specification		Breaker specification	Power consumption	
Average Power [kVA]	Peak Power [kVA]	Peak Current [A]	Average Power (stress test) [kW]	Average Power (typical game) [kW]
120 V power supply				
1	1.5	12.4	0.7	0.06
230 V power supply				
1.3	1.7	7.4	0.6	0.06

With heavy payload and/or intensive simulation - average power consumption may rise.

INFO

- Q-MODE is unavailable for QS-CH2.
- 2DoF single set of QS-210/220 works only in Heavy-Duty mode with QS-CH2.

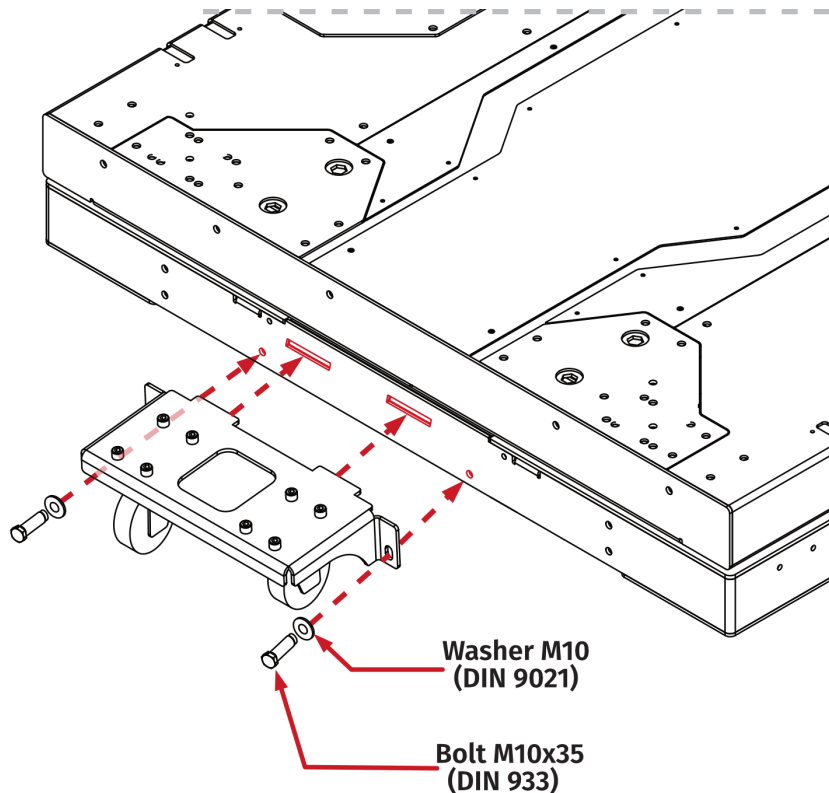
2.7. ENVIRONMENTAL CONDITIONS

The QS-CH2 should be operated within ambient conditions as specified below:

- Indoor use and storage only
- Temperature: 5° - 40° Celsius / 41° - 104° Fahrenheit
- Humidity: 0% - 70% (without water vapor condensation)
- Maximum altitude: up to 2000 m / 6561 ft

2.8. TRANSPORTATION WHEELS

Transportation wheels can be mounted for transportation purposes. Put the transportation wheels mounting bracket to the mounting points in the front and back of the QS-CH2. Screw both bolts with nuts gradually one by one using 17 mm socket wrench until the bracket is flush against the side of the device and platform is high enough to be transported.



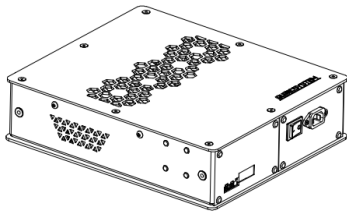
INFO

Transportation wheels can be mounted to QS-CH2 with payload attached.

2.9. COLD START PROCEDURE

For safety reasons, and in strict compliance with the requirements of ISO 14118:2017 (E) concerning the prevention of unexpected start-up, QS-210, QS-220, QS-V20, QS-CH2, and QS-S25 motion systems require one complete cycle of the Motion Lock switch whenever power is restored after being cut off or during the start-up. Follow the steps below:

1. Verify that the motion platform is OFF - the power switch on the Power Cabinet is not backlit, and **QubicManager** displays an Offline status.

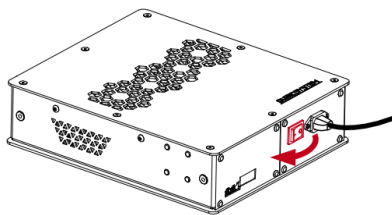


Platform's power is **OFF**

QubicManager bottom left corner:

Status: Offline/Waiting for nodes (4)

2. Turn the Power ON. The platform will not move.

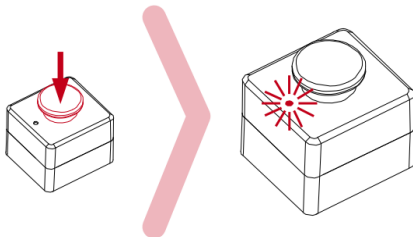


Platform's power is **ON**

QubicManager bottom left corner:

Status: Press and release Motion-Lock (5)

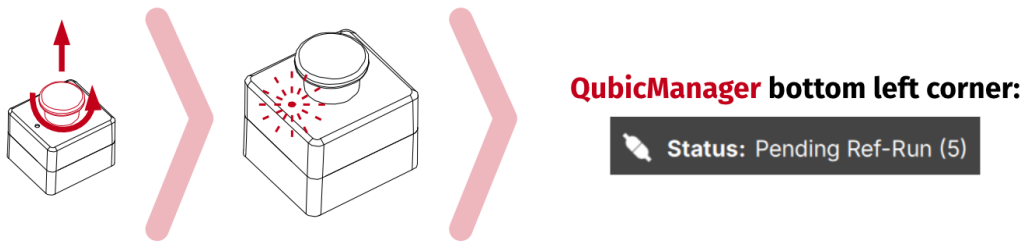
3. Press the **Motion Lock button** - diode emits constant light. The platform will not move.



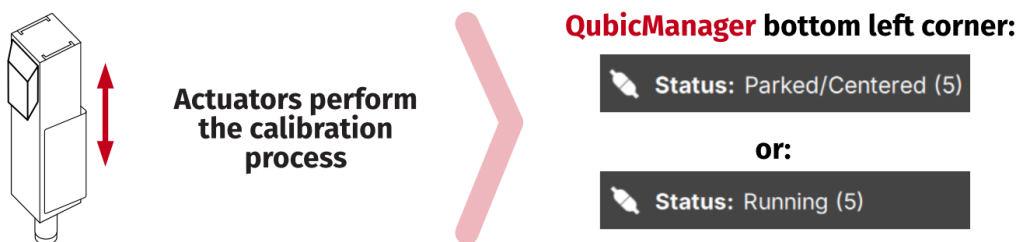
QubicManager bottom left corner:

Status: EMCY/Motion-Lock (5)

4. Turn the **Motion Lock button** counterclockwise - diode blinks. The system will perform start-up calibration. Do not change the payload.



5. If the status displays **Parked/centered** or **Running** - the motion platform is ready for operation.



INFO

- If the status displays **Status: Parked/Centered (5)** - no need to perform a Cold start procedure, the platform is ready for operation.
- If the platform was already powered ON while starting the QubicManager and status displays **Status: Press and release Motion-Lock (5)** - start from step 3.
- If the Motion Lock was already engaged during start-up and the status displays **Status: EMCY/Motion-Lock (5)** - no need to cycle through the stages, start from step 4.
- For the procedure to work, M10 controller must be powered on (via USB) - QubicManager does not have to be running.

2.10. GLOBAL PAUSE START-UP

To protect the user from unexpected machine movement, the Global Pause function is enabled by default on application startup.

If the game remains paused for more than 5 seconds, Global Pause is activated automatically to prevent the device from starting before the user is ready (e.g. seat belts are not fully fastened), which is especially useful in environments with frequent driver changes, such as racing simulator centers. When active, Global Pause is indicated by a voiceover message, an active button at the bottom of the program and a highlighted yellow frame around the button panel.



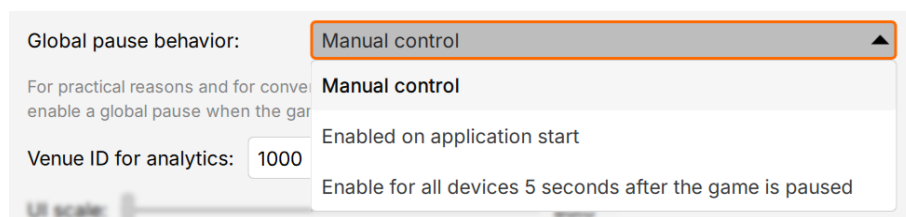
There are convenient ways of managing the global pause function using hotkeys and special buttons to disable it:

- Stream Deck button (for VR users)
- Joystick or Button Box button (for VR users)
- Hotkeys: Scroll Lock or Win + Shift + especially
- Icon on the web interface
- 3rd party application that is able to trigger `mosy://toggle-pause`

INFO

For more detailed information about global pause behavior and configuration, including pause mapping and deactivation, refer to the **Help & Tutorials** → **Automatic Global Pause** article available in QubicManager.

It can also be disabled completely in **QubicManager** → **Software Configuration** → **General settings** (scroll down) → **Global pause behavior** by selecting Manual control.



The following types of behavior are available for global pause:

- **Auto-enable 5s after the game is paused** - QubicManager automatically enables global pause after the game is paused for at least 5 seconds. User explicit action is required to turn off the global pause. This is the default configuration.
- **Enabled on application start** - Global pause is enabled automatically on Qubic Manager start, but once it is disabled by the user, no automatic actions are performed.
- **Manual control** - Global pause is never automatically enabled, user has full control.

WARNING

Disabling the Global Pause function is performed at the **user's own responsibility** and should only be done by users who understand the operation of the device and are aware of the associated risks.

3. INSTALLATION

WARNING

Use small amount of medium strength thread locker on all mounting bolts that are not screwed in with a locknut.

Bolts tightening torque values:

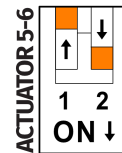
Bolt	Size	Torque
DIN 912	M8 x 40	23 Nm
DIN 912	M8 x 12	23 Nm
DIN 7991	M8 x 20	17 Nm
DIN 7380-1	M6 x 16	7 Nm

3.1. REMOVING TOP COVER

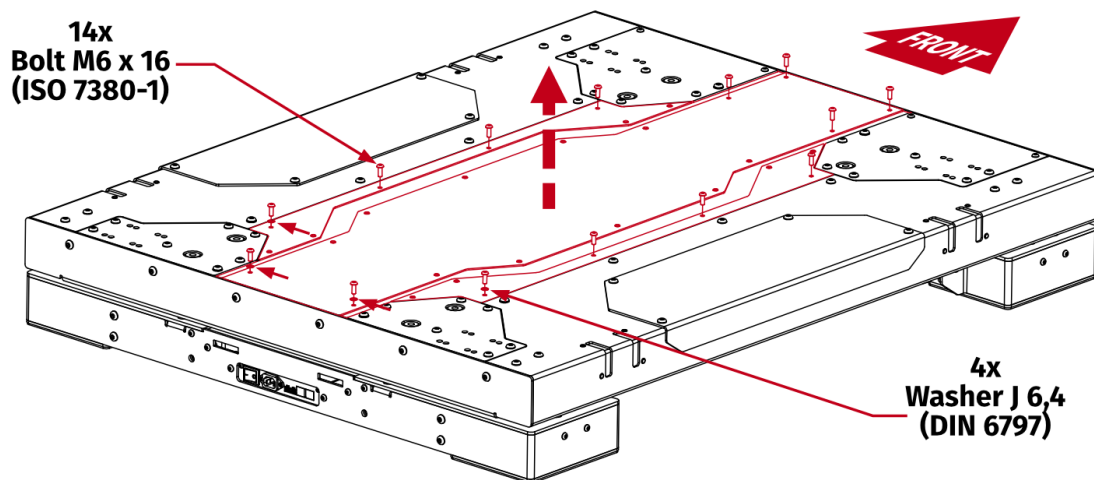
Different setups may need different CFG switch configurations. Go to section 3.10 on page 24 for full connection diagrams.

INFO

By default, the CFG switches are set for a 5DoF setup
- actuators 5-6 (QS-CH2 last in the M-BUS circuit):

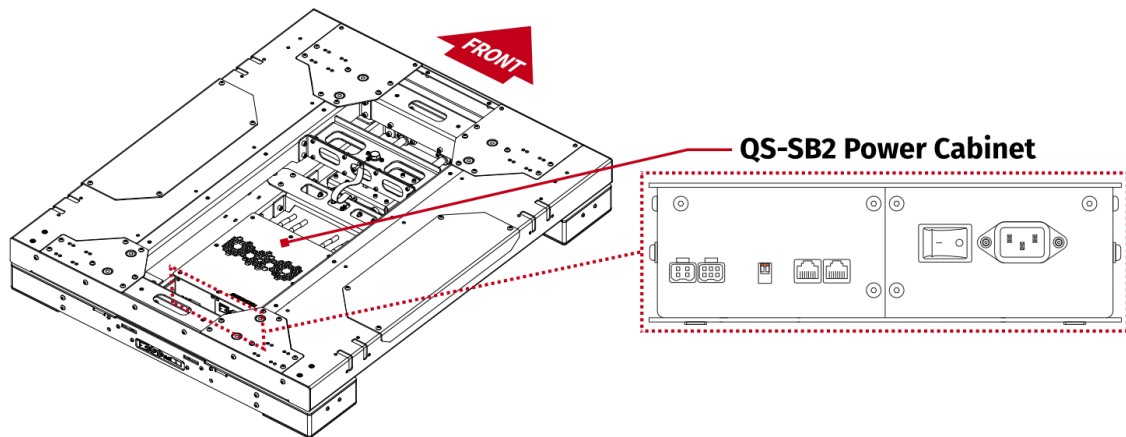


In order to gain access to the QS-SB2 Power Cabinet the top cover needs to be removed. To remove the cover unscrew 14x DIN 7380-1 M6 x 16 bolts using 4 mm hex key as shown below:



INFO

The revised version of the QS-CH2 is equipped with push-pull actuator connectors which are connected with Power Cabinets from the factory and **DO NOT** require any attention from the user.



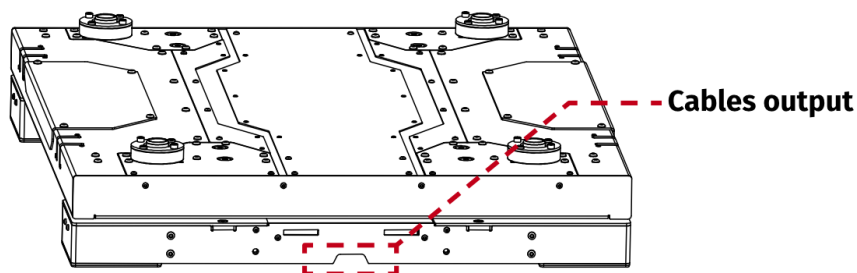
3.2. PREVIOUS REVISION WITH NO CONNECTION PANEL - SWITCHING THE POWER SWITCH ON

In previous revisions there was no cable connection panel - while the top cover is removed, ensure that the power switch on Power Cabinet is in the ON position (dash, instead of a circle). Once the switch is ON - the backlight is ON.

After installing the cockpit on top of the QS-CH2 it will no longer be possible.

INFO

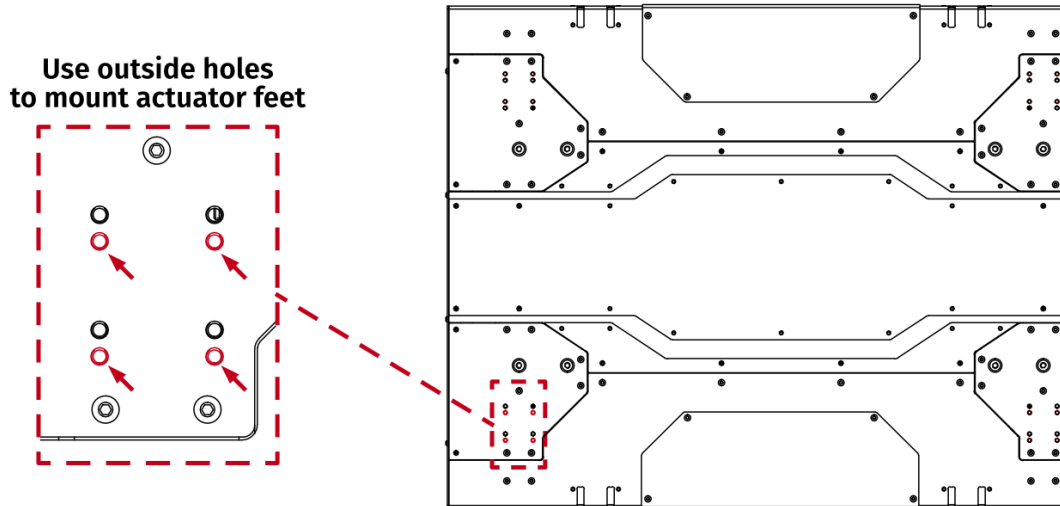
While the top cover is off - also ensure correct CFG switch setup. Go to section 3.8 on page 22 for more details.



3.3. QS-CH1/QS-210/QS-220 ACTUATORS MOUNTING FEET

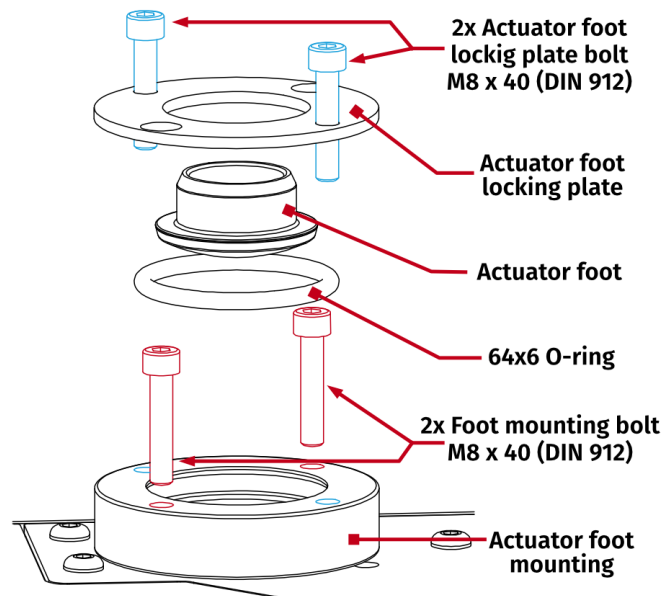
In order to mount Qubic System motion actuators onto the QS-CH2 platform - all actuator feet must be screwed in with the actuator feet and the locked in place by the top locking plate.

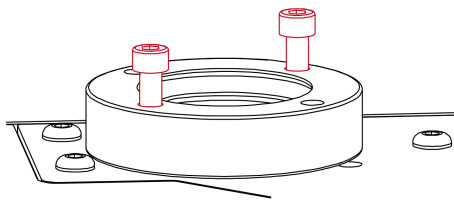
Actuator feet mounting holes:



INFO

Disassembled elements of QS-CH2's Actuator foot:



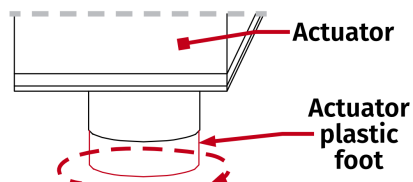


1. Screw in all 4 of actuator feet mountings to the platform.

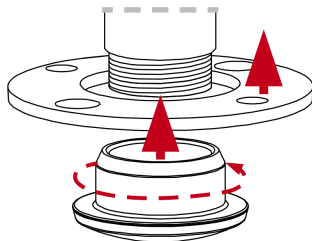
2. Lift the platform to gain access to actuator feet.

WARNING

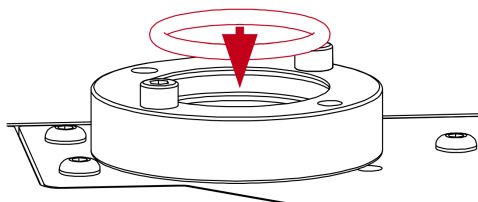
- Gaining access to the bottom of actuator rods requires lifting up the full cockpit. Due to weight of the motion platform use only certified car-lift or hoist and **ALWAYS** place car-stands under lifted cockpit as a safety measure.
- Actuator feet are filled with grease - do not remove it. Use rubber gloves during installation.



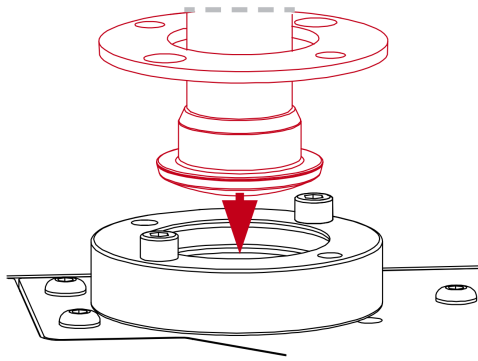
3. Remove all plastic feet from the actuator by unscrewing them counterclockwise.



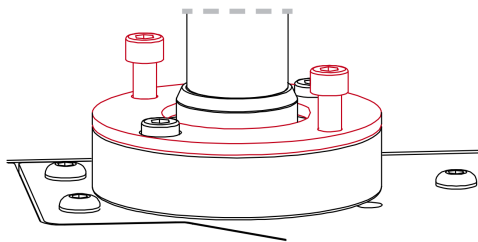
4. Slide the Locking plates into the actuator rods and screw in QS-CH2's actuator feet.



5. Place the O-rings into the feet mountings.



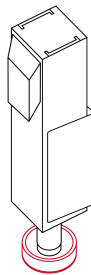
6. Lift the full platform and place into the Actuator mountings.



7. Screw in the actuator foot locking plates.

8. Torque down all bolts. For torque values go to page **14**.

INFO



- All actuators **MUST** be placed on Actuator feet.
- Actuator feet are filled with grease - do not remove it. Use rubber gloves during installation.
- Tolerance for piston rod misalignment relative to Actuator foot center point is **max. 5 mm**.

3.4. CUSTOM COCKPIT ACTUATOR FEET ADJUSTMENT

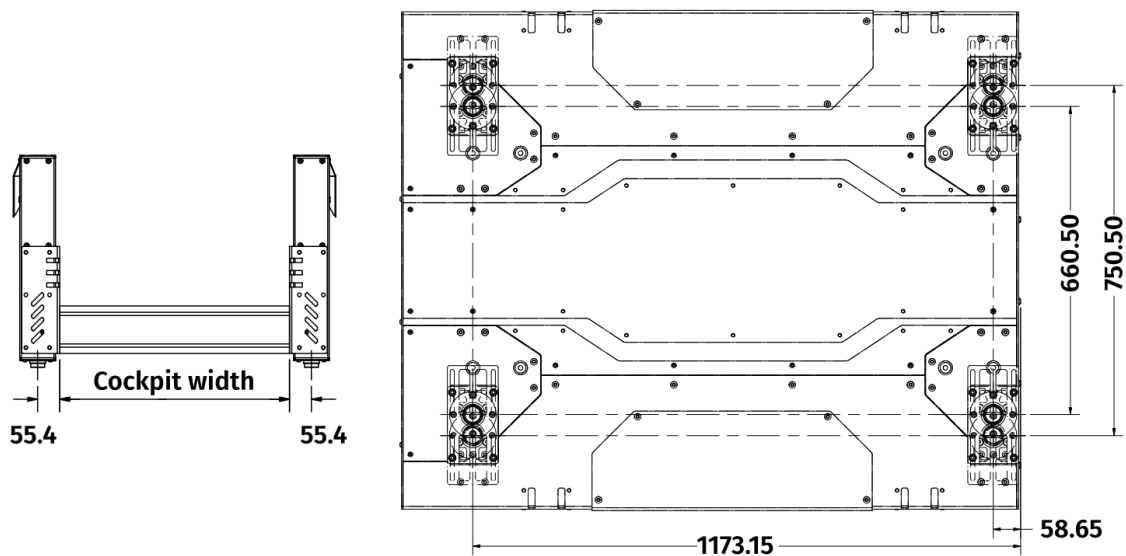
In order to fit a custom motion actuators implemented cockpit - transverse adjustment will be needed. Use included adjustment plates to set the width of actuator feet.

INFO

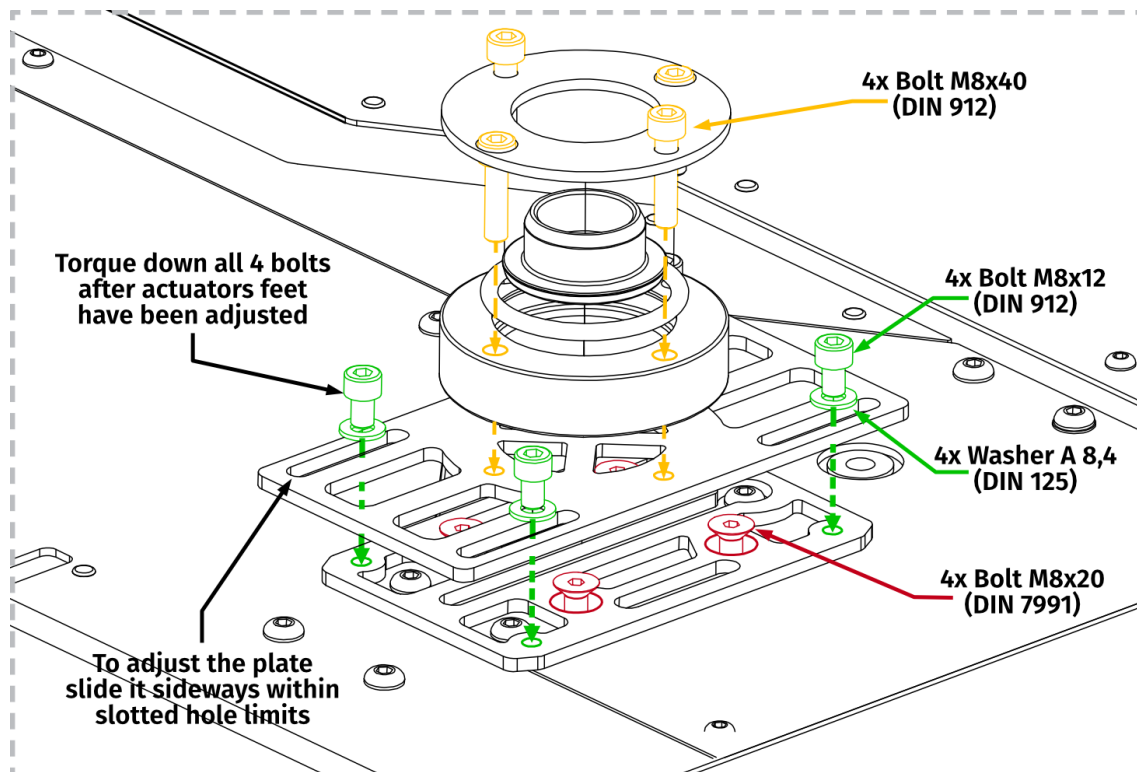
To calculate if your cockpit will fit QS-CH2's Actuator feet adjustment range:

$2 \times 55.4 \text{ mm} + \text{cockpit width} = \text{must be between } 660.5 \text{ mm and } 750.5 \text{ mm}$

Adaptability dimensions (both QS-210 and QS-220's actuator rod center axis to adapter edge measure 55.4 mm):



Use adjustment plates to make the actuator feet wider or more narrow to accommodate for the custom cockpit. Mount the actuator feet on top of adjustment plates:

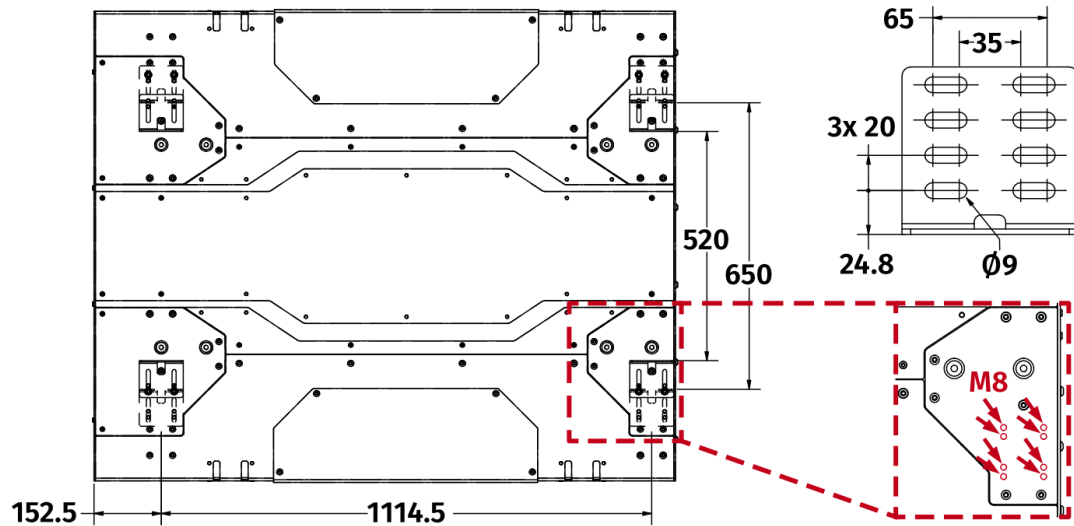


In order to adjust the plates to your specific cockpit - slide the plates sideways within slotted hole limits. After adjustment is done, torque down all DIN 912 M8 x 12 bolts.

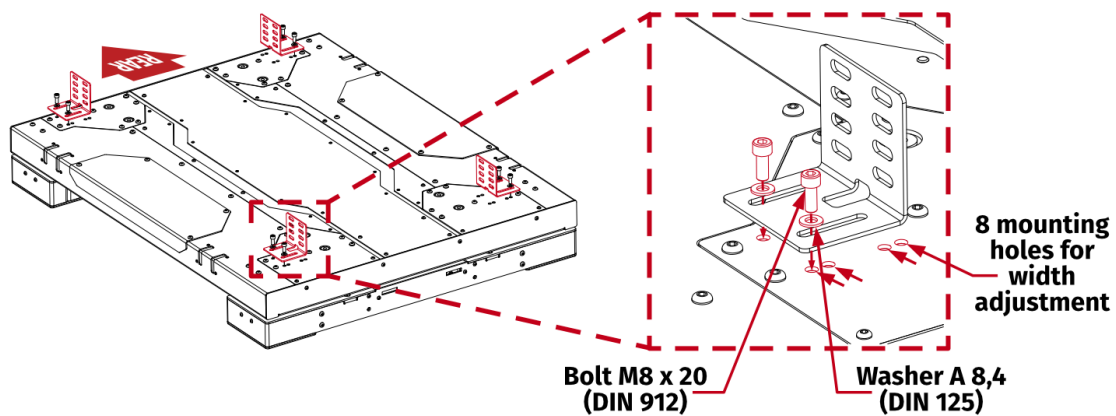
For torque values go to page 14.

3.5. UNIVERSAL COCKPIT ADAPTER BRACKETS

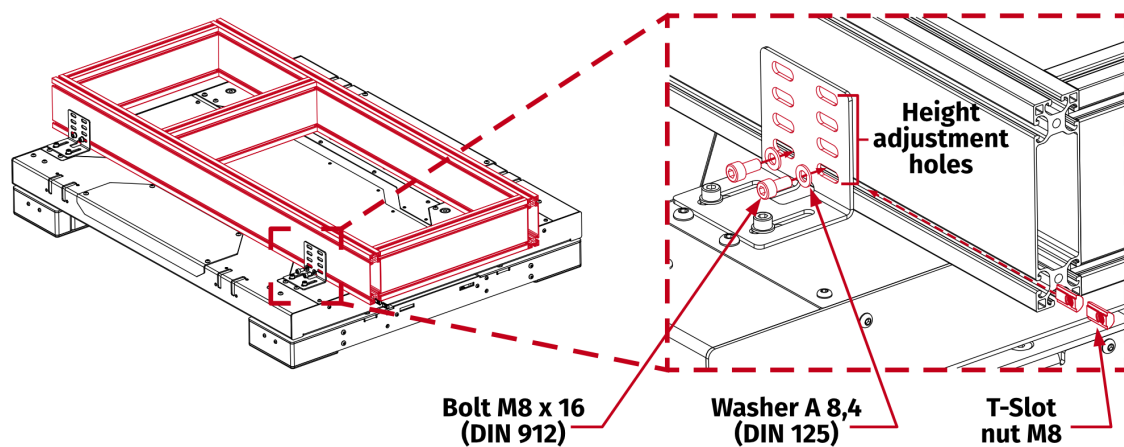
In order to install an aluminum profile cockpit, use included Universal adapter brackets and fasteners.



Mount the universal adapters, using two of the adjustment holes:

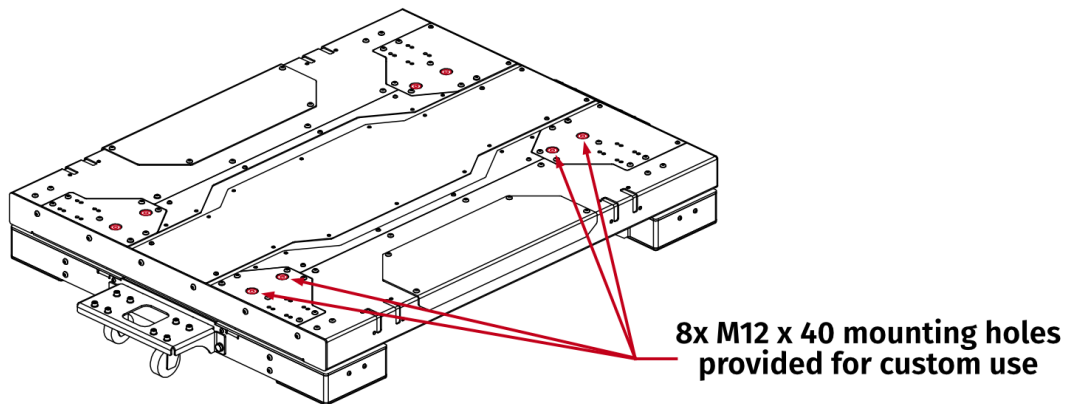


Mount the aluminum profile cockpit, using two of the adjustment holes:



3.6. OPTIONAL MOUNTING HOLES

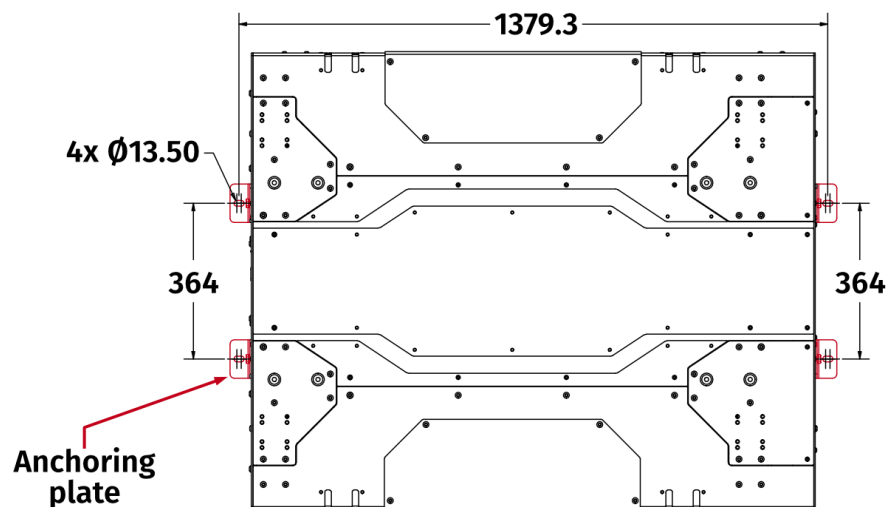
QS-CH2 is equipped with optional mounting holes for custom user-defined applications:



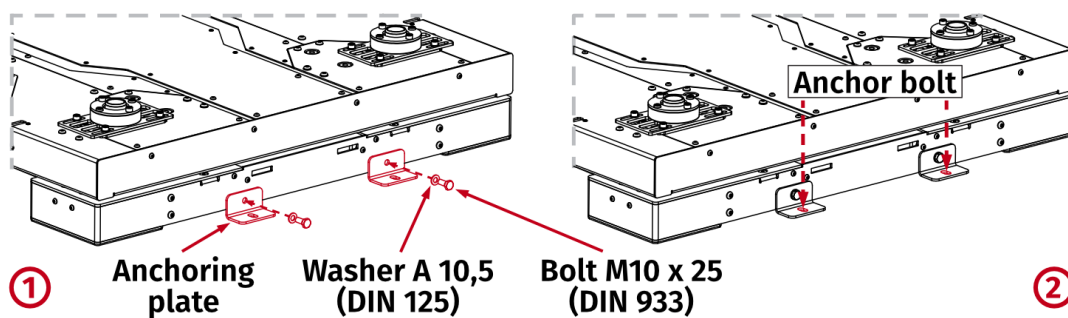
For details on holes dimensions - go to section 2.3 on page 7.

3.7. ANCHORING

To prevent QS-CH2 from moving around during gameplay - it is **recommended** to anchor it to the ground.



Anchoring plates installation:



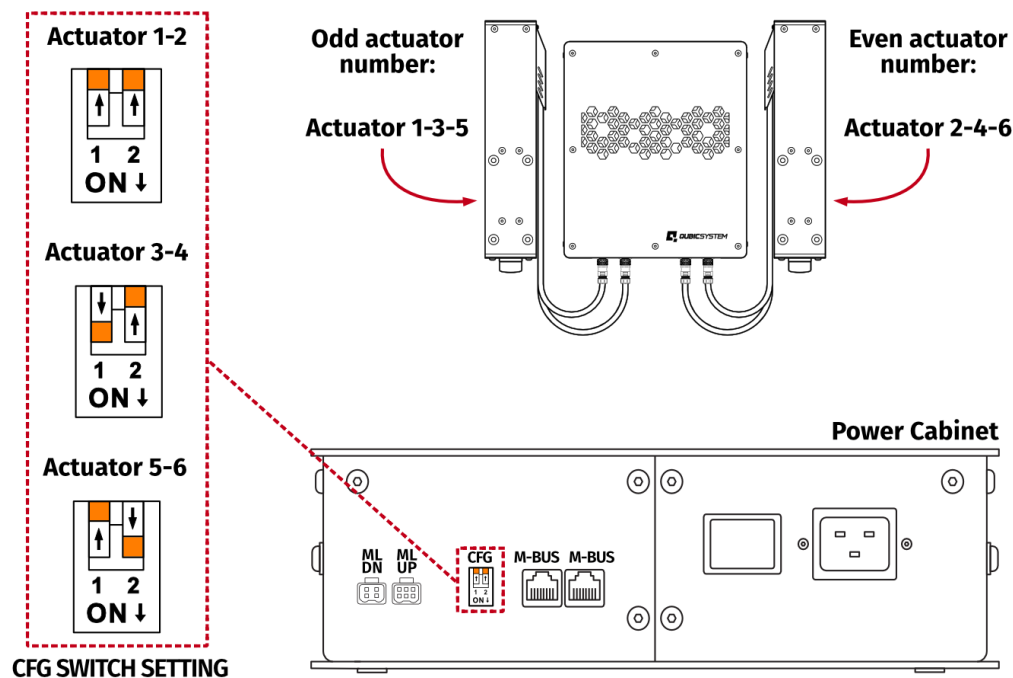
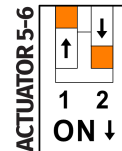
3.8. CFG SWITCH CONFIGURATION

CFG switches need to be set to appropriate positions in accordance with actuator number. Actuator number can be found on the sticker on the Power Cabinet.

If you want to change the layout of the actuators you need to change the CFG switches setting by switching to number of the actuators they represent.

INFO

By default, the CFG switches are set for a 5DoF setup
- actuators 5-6 (QS-CH2 last in the M-BUS circuit):



WARNING

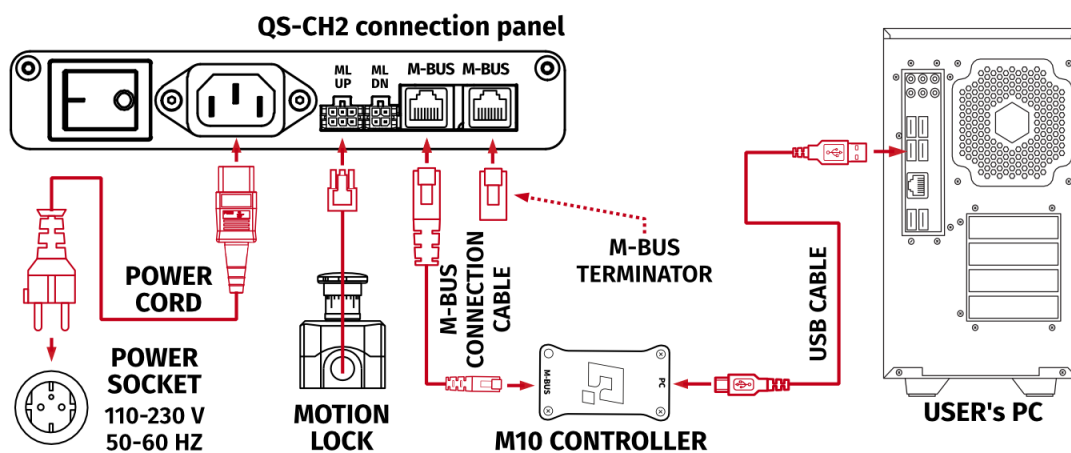
- The CFG Switch **CANNOT** be set in the same position in either of power cabinets.
- When changing CFG Switch setting the main power must be **SWITCHED OFF**.
- When changing the CFG Switch setting **FIRMLY SET THE SWITCH** into lower or upper position. Do not leave the switch in the floating position (neither up or down position), otherwise the device will not work.

3.9. CONNECTING QS-CH2 INDEPENDENTLY WITH USER'S PC

When running QS-CH2 **independently**, QS-MC6 set (including M10 controller, Motion Lock button and M-Bus terminator) is required. It is not included in a base QS-CH2 set and has to be purchased separately.

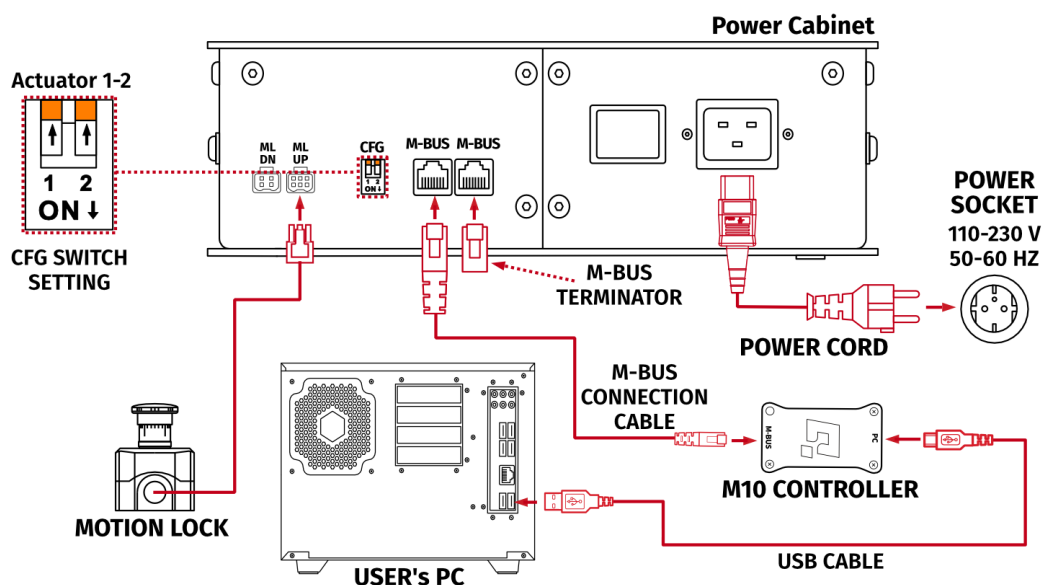
INFO

- By default, the CFG switches are set for a 5DoF setup - actuators 5-6 (QS-CH2 last in the M-BUS circuit). When QS-CH2 is connected independently - **the CFG dipswitches must be changed to 1-2**. You must gain access to the Power cabinet - go to section 3.1 on page 14 for top cover removal instructions.

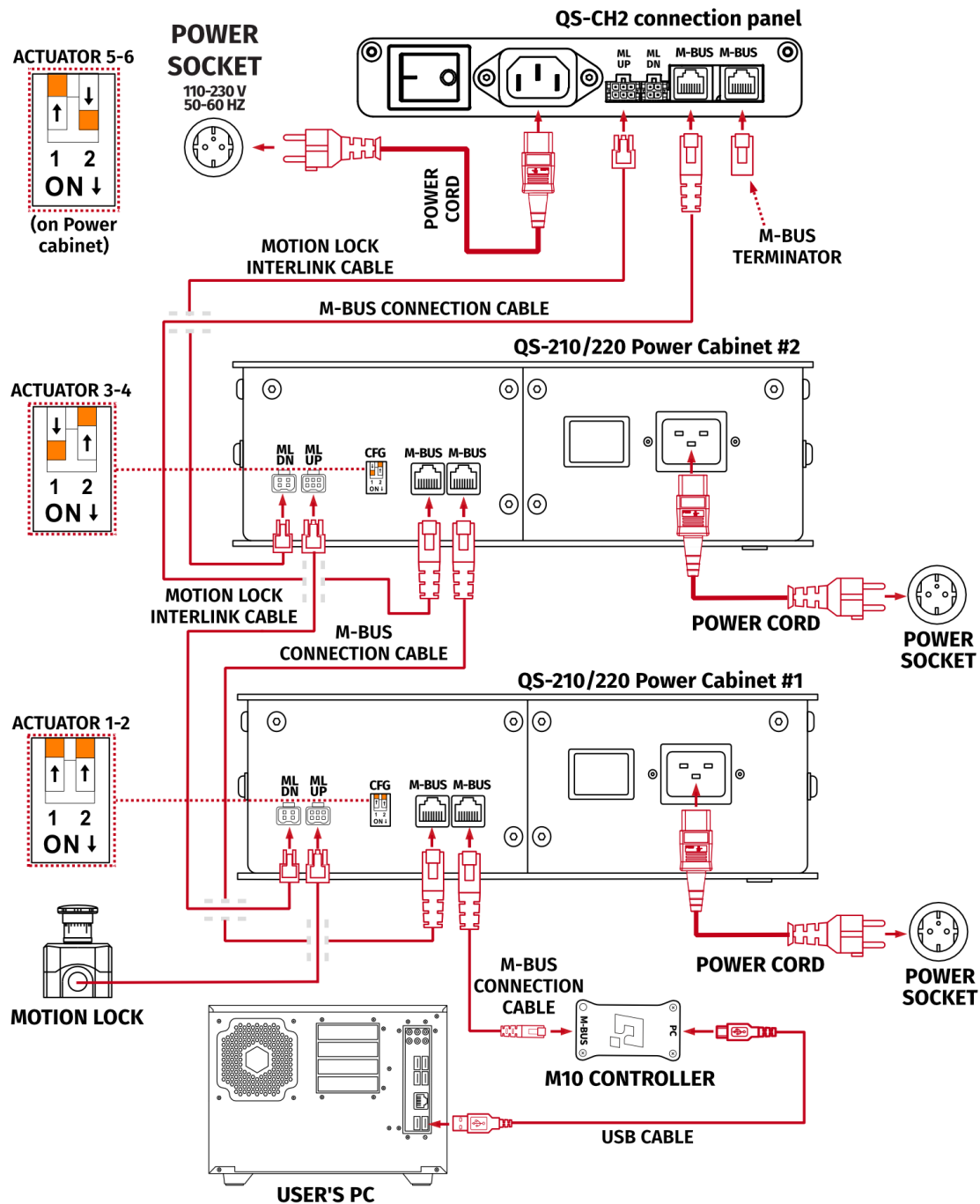


INFO

Previous revisions were not equipped with a connection panel - all cable connections must be performed at the Power cabinet directly.



3.10. CONNECTING QS-CH2 WITH QS-210/220

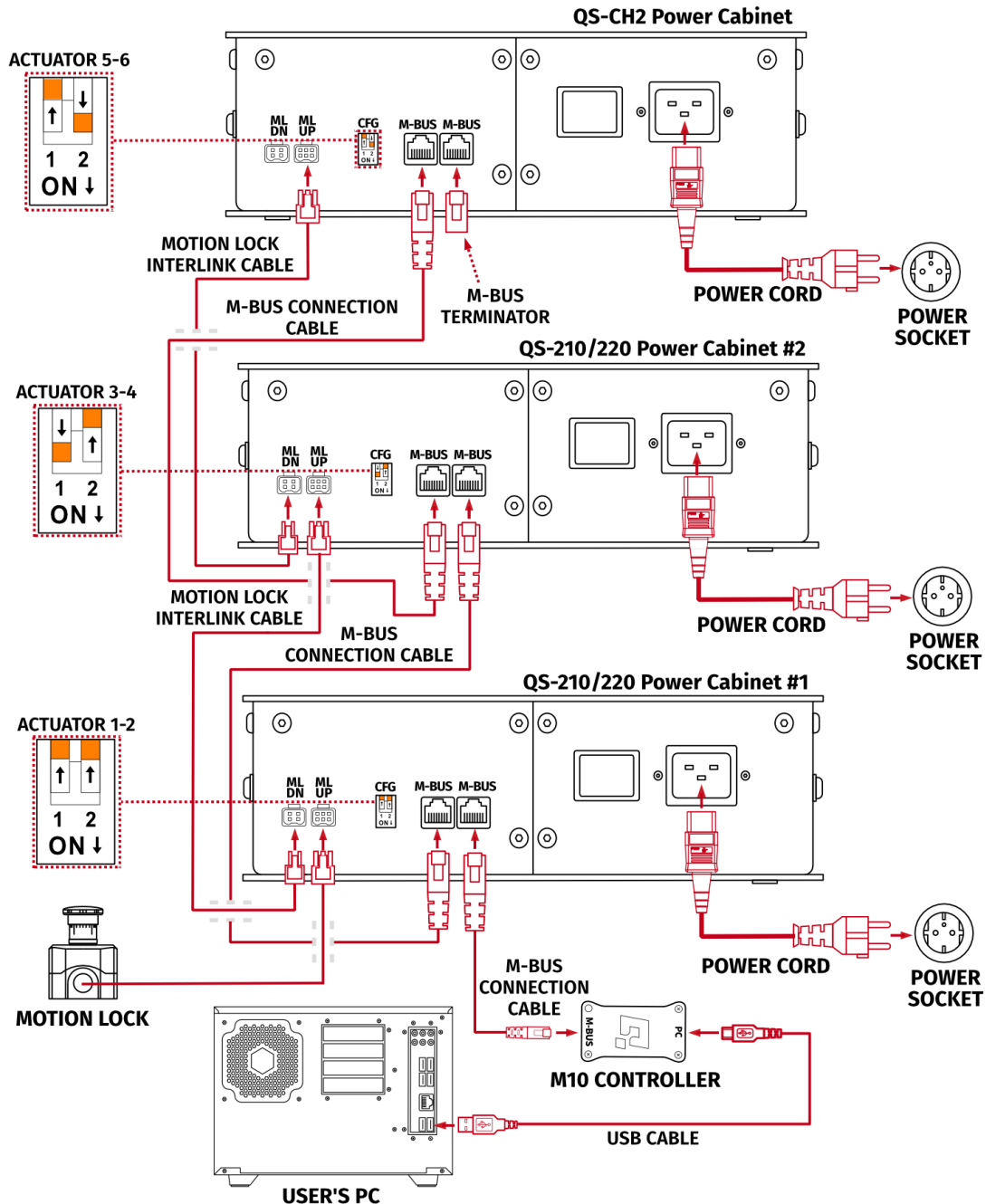


INFO

- Order of connecting the cables is not important, you can connect the M10 controller or Motion Lock Switch to either one of the Power Cabinets.
- When connecting QS-CH2 with 3DoF set of QS-210/220 the CFG switches in the QS-CH2 must be set to actuator 5-6 setting (as shown on 22 in section 3.8).

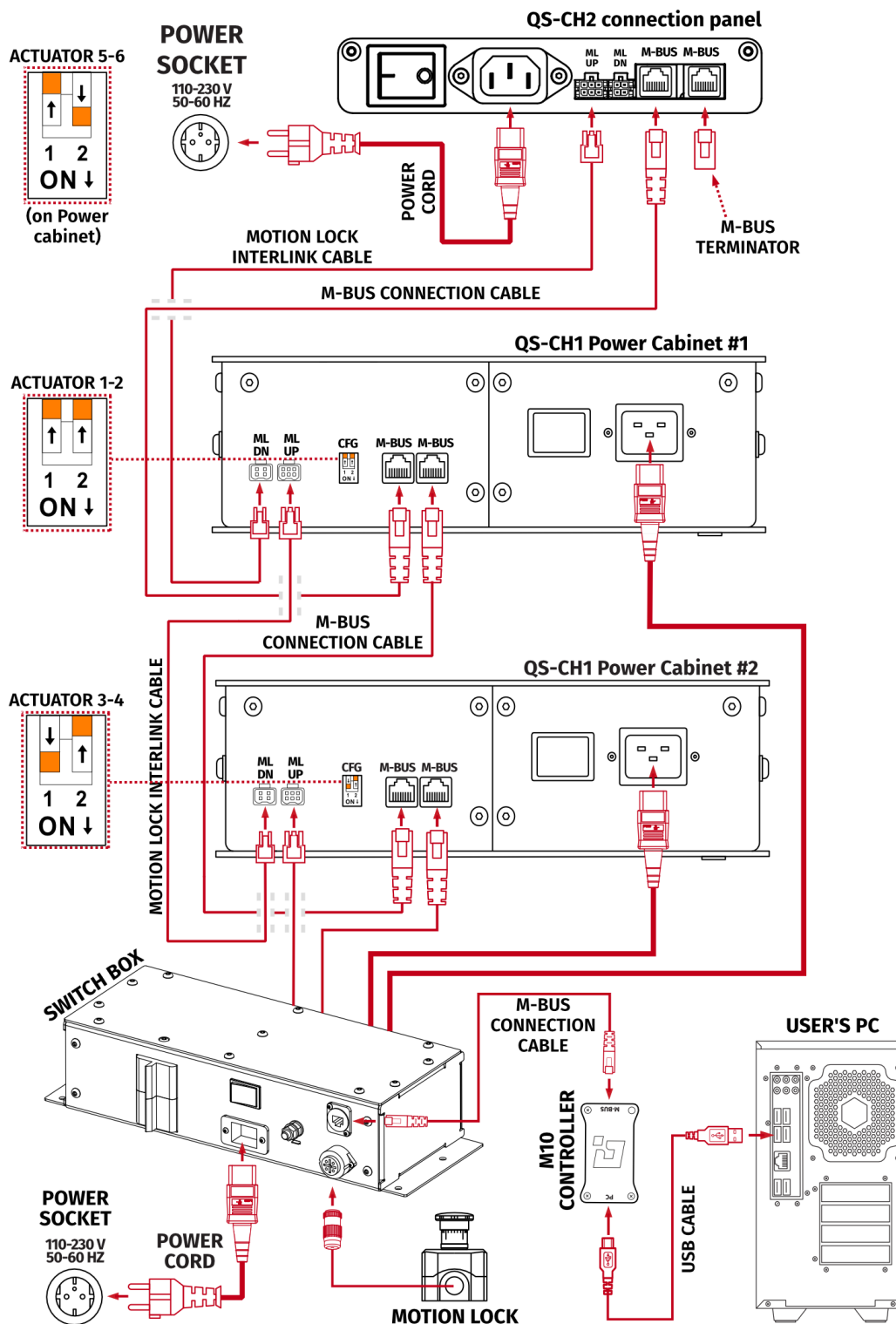
INFO

Previous revisions were not equipped with a connection panel - all cable connections must be performed at the Power cabinet directly.



If you must gain access to the Power cabinet - go to section 3.1 on page 14 for top cover removal instructions.

3.11. CONNECTING WITH A COMPATIBLE QS-CH1 MOTION PLATFORM

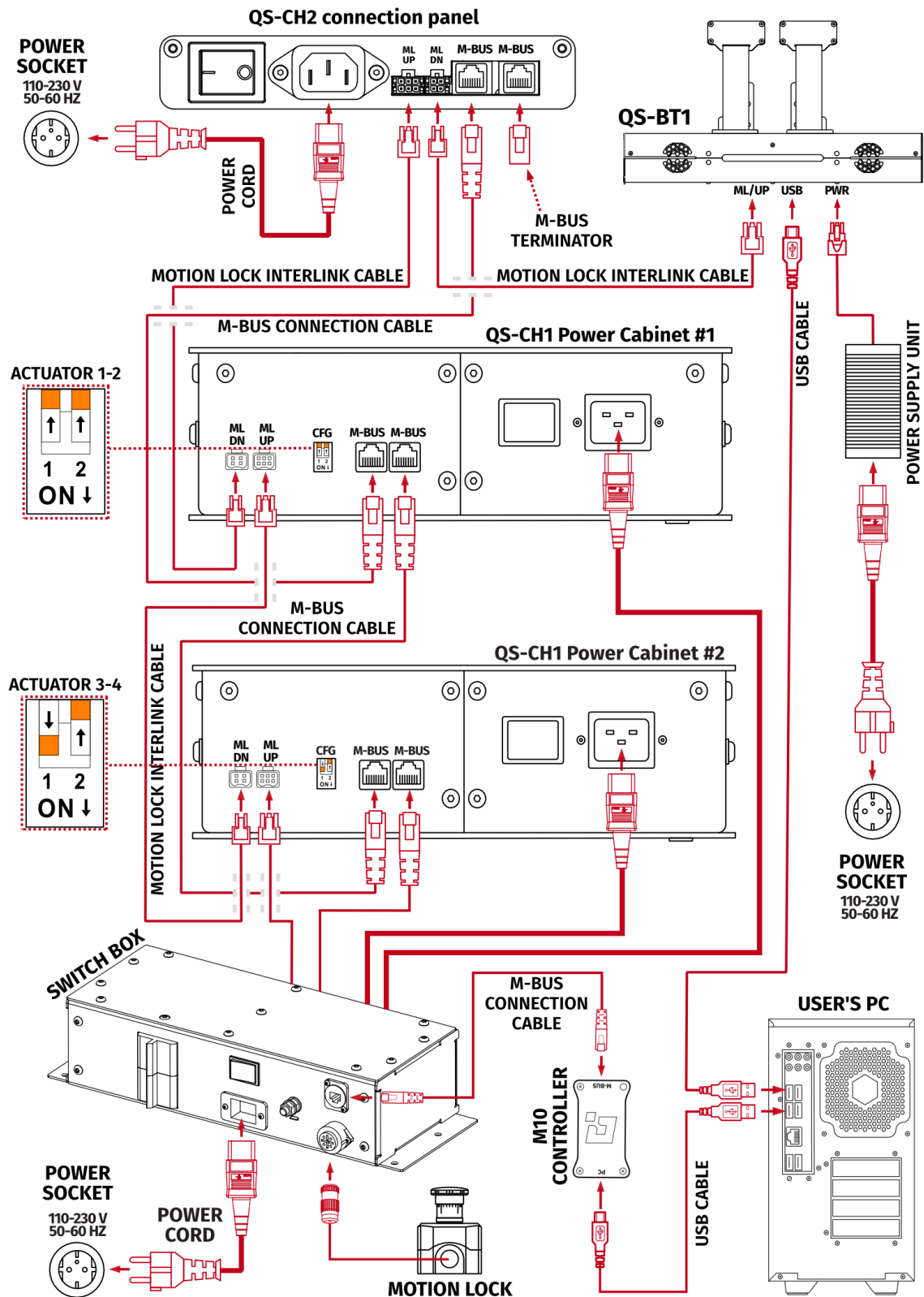


INFO

Previous revisions were not equipped with a connection panel - all cable connections must be performed at the Power cabinet directly. Go to section 3.10 on page 24 for details.

3.12. CONNECTING WITH QS-CH1 AND QS-BT1 BELT TENSIONER

QS-BT1 belt tensioner can be implemented into the Motion Lock circuit, by using Motion lock interlink cable. Data communication with the PC is separate from M-BUS circuit via USB.

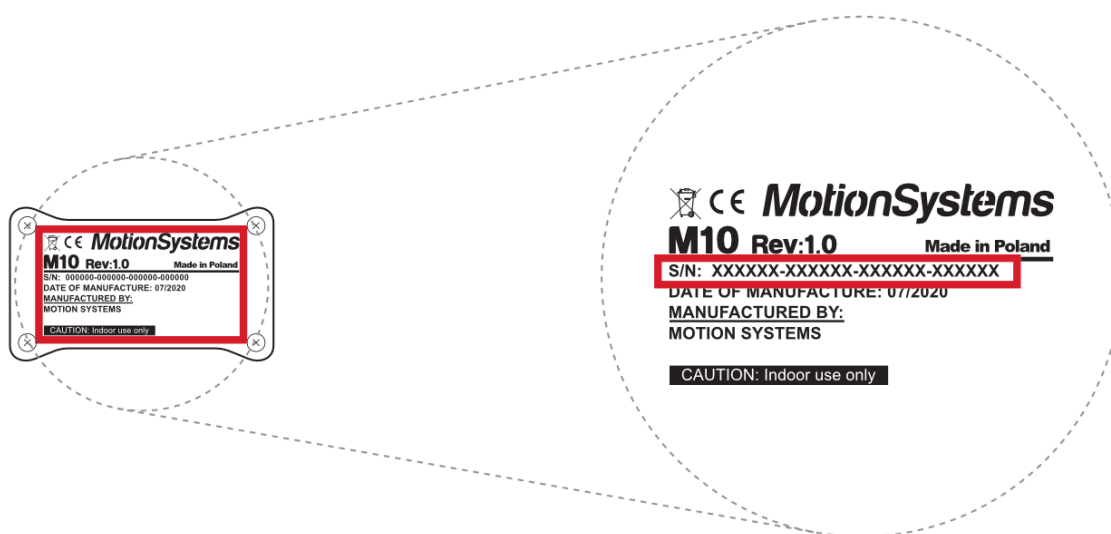


3.13. SOFTWARE INSTALLATION

INFO

Note down the QS-CH2 serial number before installation as it is needed to access software download page.

The **SERIAL NUMBER** can be found on the M10 identification label in the **XXXXXX-XXXXXX-XXXXXX-XXXXXX** format. This serial number is also used for activation of FSMI (Force-SeatMI) and MT (Motion Theater) licenses - more information on page 35.



To download the software visit: QubicSystem.com/Download

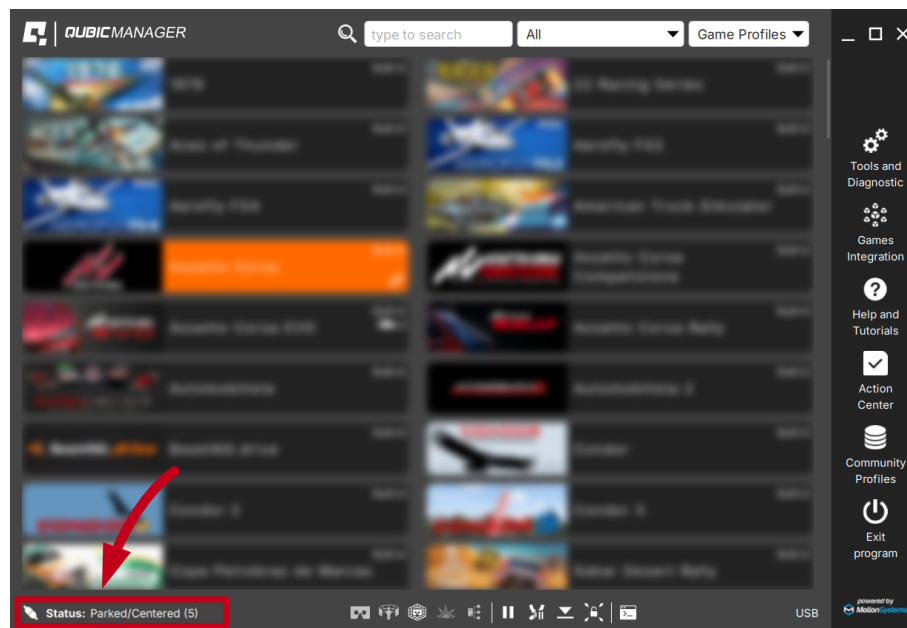
Once the QS-CH2 is installed and connected correctly:

1. Download **Qubic Manager Software**.
2. Proceed with the installation steps and launch the application.
3. Connect power connection cord to the wall socket.
4. Turn on the system by switching on the power switch button (section 3.2 on page 15).
5. Cycle through the Motion Lock Switch positions - press and unpress it (go to section 2.9 on page 11 for a details on the procedure).
6. The QS-CH2 will perform a start-up calibration.

WARNING

- **DO NOT** change the payload during the start-up calibration.
- **DO NOT** enter the cockpit during the start-up calibration.

7. If Qubic Manager has recognized the QS-CH2 correctly, the status of the machine visible in the lower left corner will change to **Parked/Centered** (after Global Pause has been disabled - details in section 2.10 on page 12).

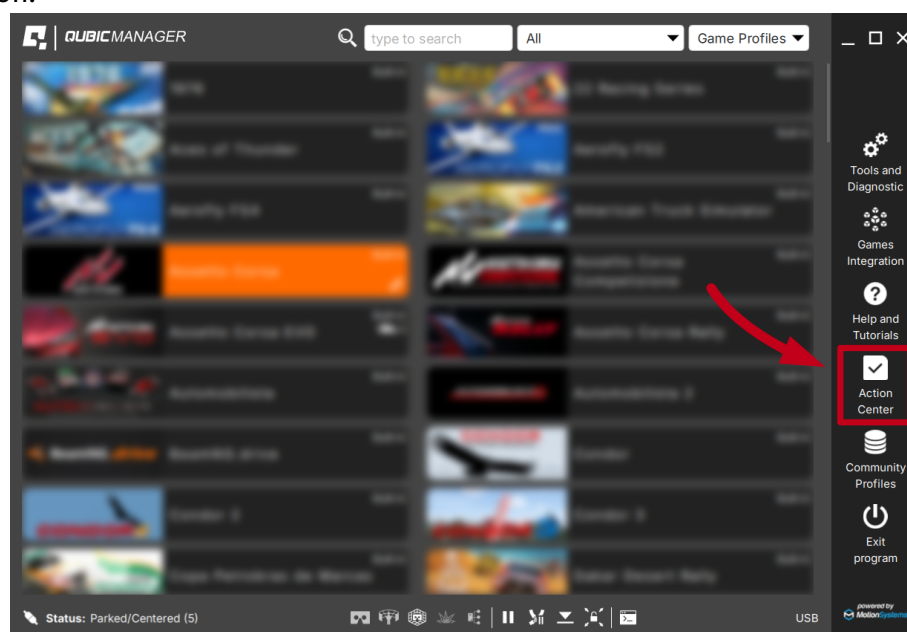


WARNING

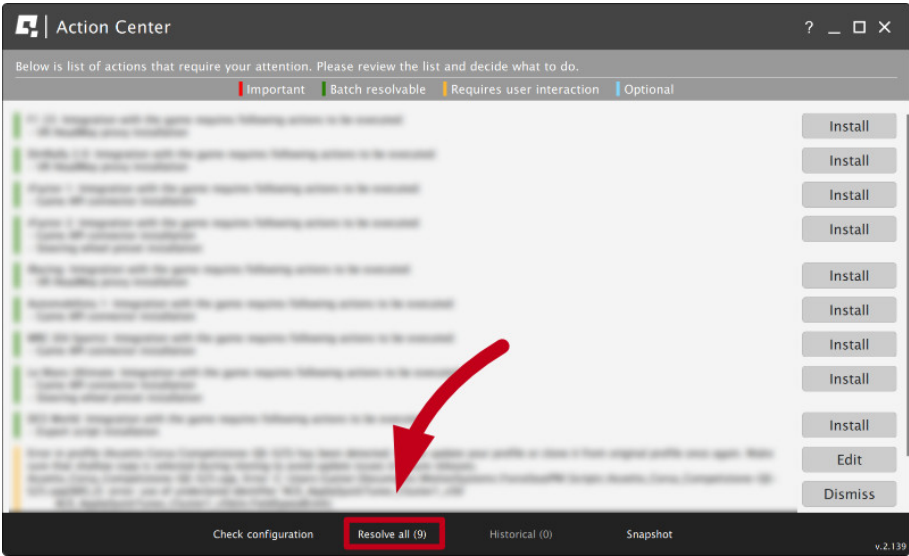
If the device did not connect correctly:

- Go over the cable connections - compare the connections to the diagram again, look for loose plugs or damaged cords.
- Go to **Troubleshooting** section on page 38.

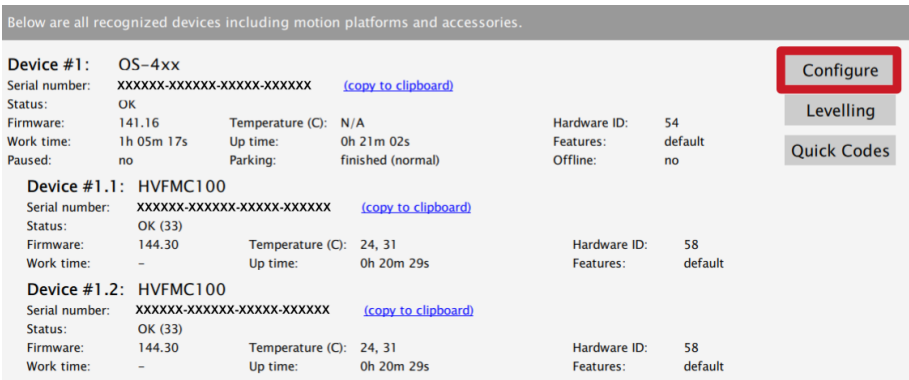
8. Check **Action Center** on the right side panel for a list of actions that requires attention:



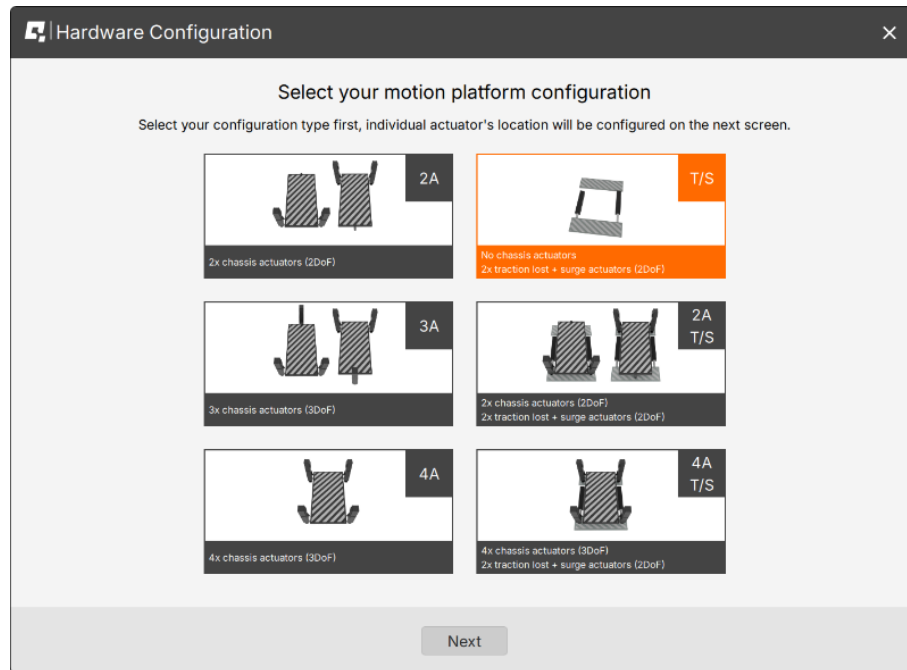
9. It is possible to solve them one by one or by pressing the **Resolve All** button. Firmware update may require additional confirmation in the dialogue box.



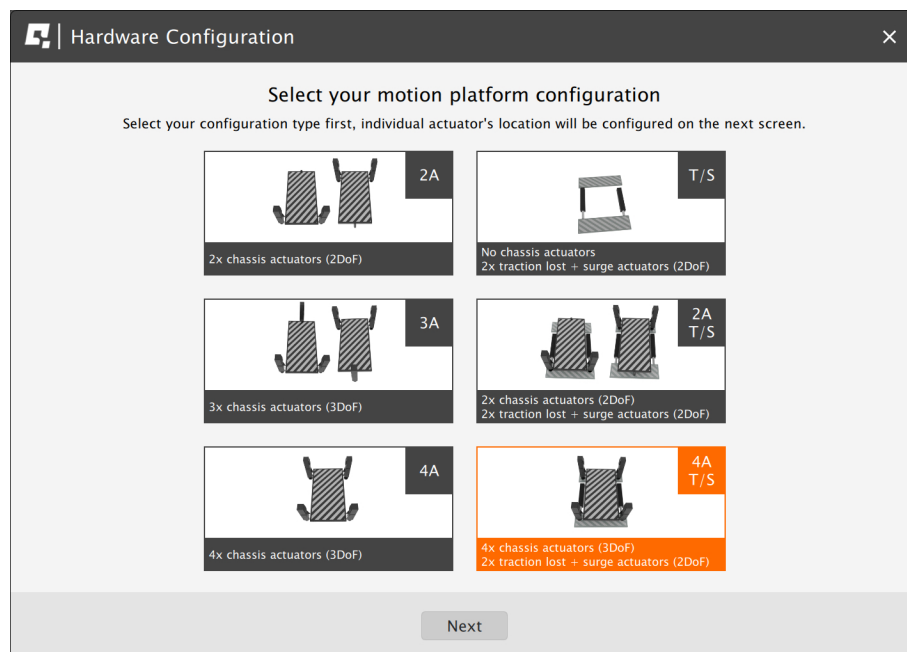
10. Go to **Tools and Diagnostics** → **Devices** and select **Configure**.



11. Choose the correct layout variant from the list (traction loss).



For QS-210/220 3DoF setup with traction loss control (QS-CH2): Choose the correct layout variant from the list (4A T/S setup).



- 12.** Platform dimensions for QS-CH2 are entered by default. In case of 5DoF platform (4A T/S) for dimensions between vertical actuators of QS-CH1 or QS-210/220 - follow instructions in the window or refer to User Manual of the specific QS-device (QubicSystem.com/User-Manuals).

Hardware Configuration

Platform dimensions

Actuators geometry is based on rectangle shape. To make everything work properly you need to specify width and length of that rectangle. Only valid values guarantee that system is stable and math calculations are correct.

T-Pivot [mm]: 799

T-Width [mm]: 796

T-Min [mm]: 838

T-Stroke [mm]: 100

Since different models of traction units are available, to make sure your geometry is configured correctly, select your model from the list below to upload its configuration.

Configure for: (select)

If the position of the actuators in the cockpit is different from that shown in the figure on the right, choose a different layout. Not all combinations are supported. If you do not find a layout that matches your settings, you will have to change the position of the actuators in the cockpit.

NOTE: If you are not sure what are your actuators indexes, use **Identify** action in the section below to locate them in your cockpit.

OK

- 13.** Scroll down and choose one of the operation modes:

Operation Mode

Operation modes let you flexibly adapt the system configuration to varying requirements, maximizing the use of available system resources. You can define one of the operation mode to increase your device performance.

Heavy-Duty Moderate acceleration Moderate speed Increased payload 115/230 VAC ☐	Performance Increased acceleration Increased speed Moderate payload 115/230 VAC ☒	Q-MODE Maximum acceleration Maximum speed Reduced payload only 230 VAC ☐
--	---	---

OK

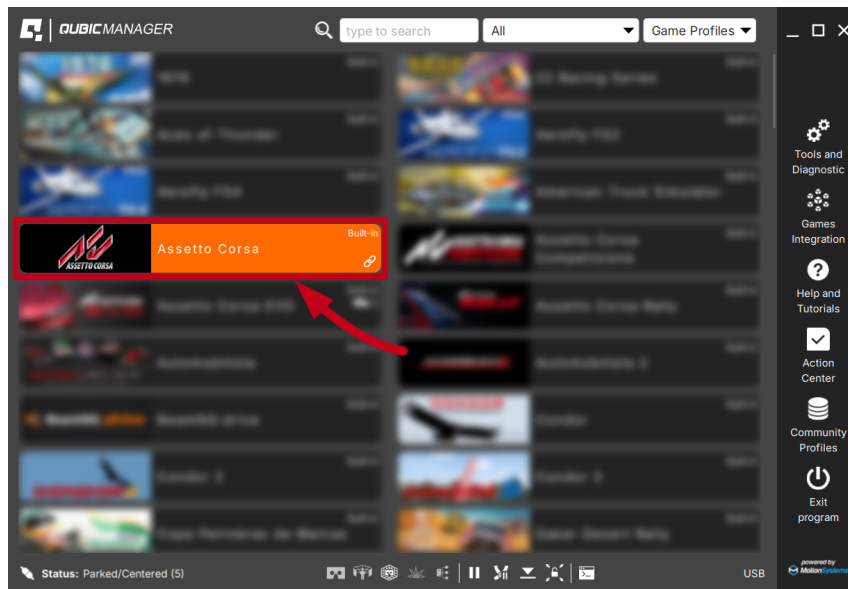
INFO

- Q-MODE is unavailable for QS-CH2.
- 2DoF single set of QS-210/220 works only in Heavy-Duty mode with QS-CH2.

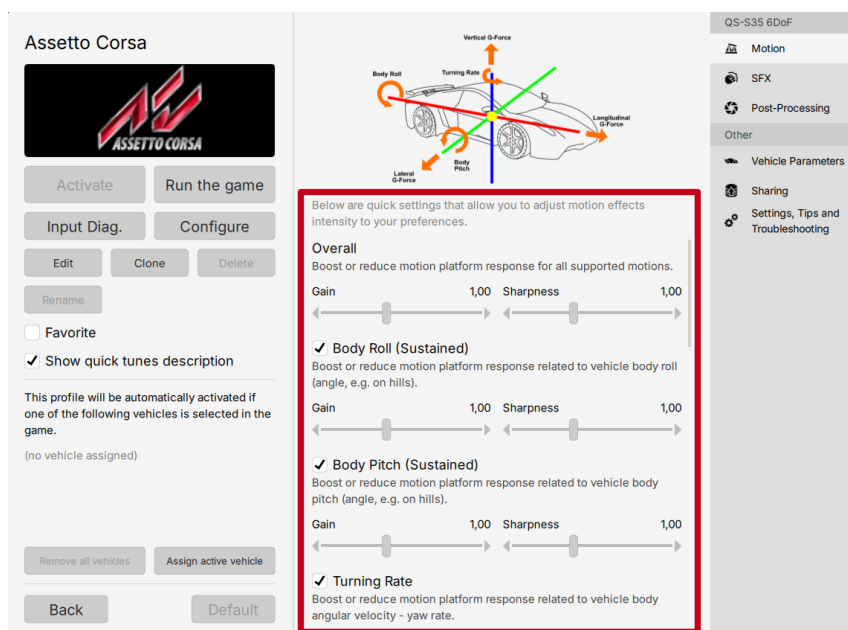
14. Close the configuration and return to the main application window. Choose the game and check profile details by clicking on the game tile.

INFO

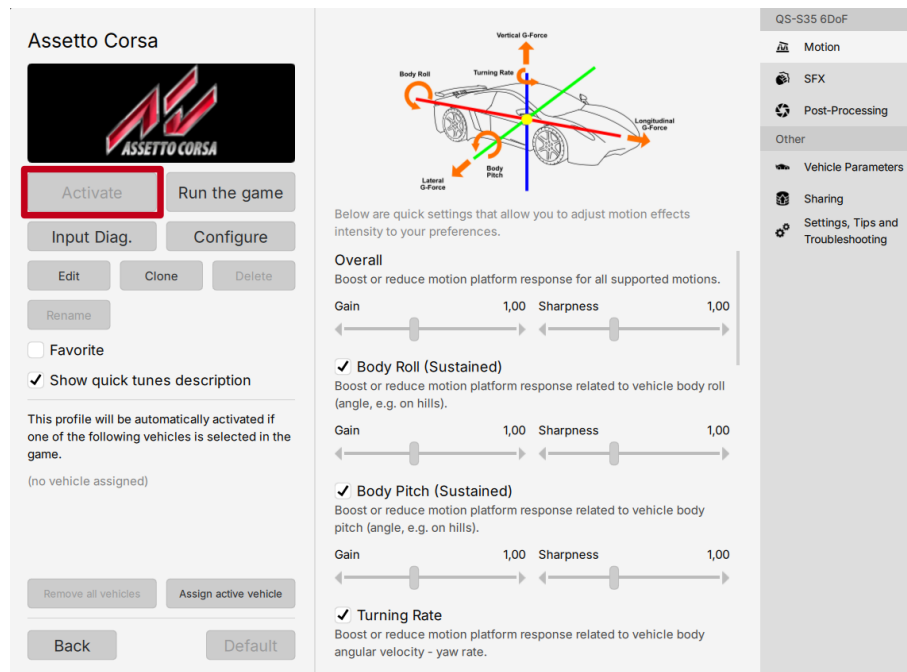
Default profiles are integrated with the software and do not require additional installation. List of supported games is available at: QubicSystem.com/Supported-games.



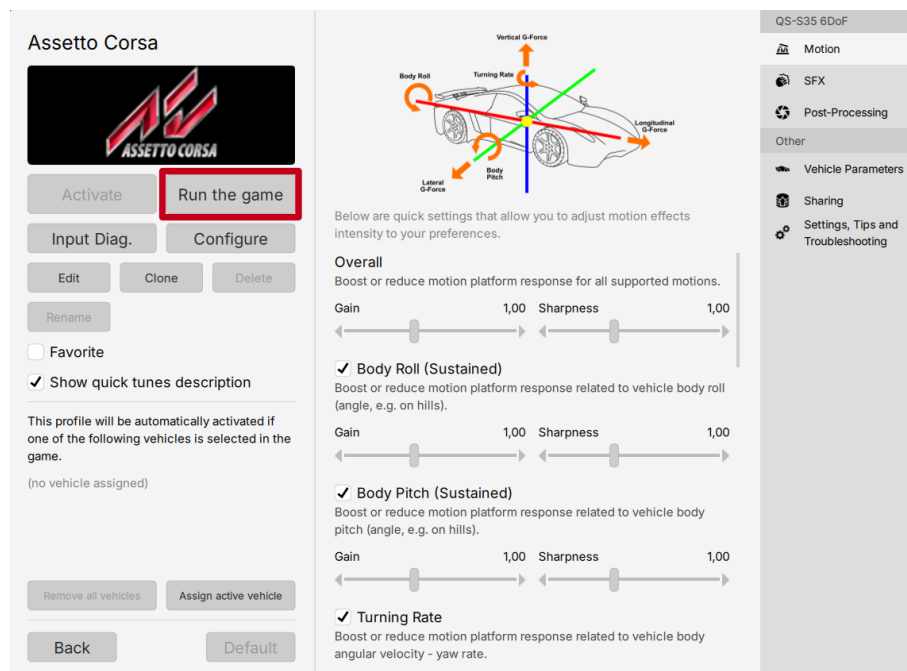
15. Adjust the motion effects intensity up to your preferences in the game profile window. Scroll down to see all of the settings.



16. Activate a profile by clicking the **Activate** button.



17. Launch the game by clicking the **Run the game** button.



18. You can also adjust the settings during the game simulation by pressing **ALT+TAB** and switching between the applications - once the profile is active changes will apply instantly.

INFO

If you need the serial number to activate other software licenses such as ForceSeatMI or ForceSeatDI, it can be found in the QubicManager. After connecting the QS-CH2 go to **Tools and Diagnostics** → **Devices**. Serial number is visible under the device name:

Below are all recognized devices including motion platforms and accessories.

Device #1: QS-4xx				(copy to clipboard)	Configure
Serial number:	XXXXXXXX-XXXXXX-XXXX-XXXXXX				
Status:	OK				Levelling
Firmware:	141.16	Temperature (C):	N/A	Hardware ID:	54
Work time:	1h 05m 17s	Up time:	0h 21m 02s	Features:	default
Paused:	no	Parking:	finished (normal)	Offline:	no
					Quick Codes
Device #1.1: HVFMC100					
Serial number:	XXXXXXXX-XXXXXX-XXXX-XXXXXX			(copy to clipboard)	
Status:	OK (33)				
Firmware:	144.30	Temperature (C):	24, 31	Hardware ID:	58
Work time:	-	Up time:	0h 20m 29s	Features:	default
Device #1.2: HVFMC100					
Serial number:				(copy to clipboard)	
Status:	OK (33)				
Firmware:	144.30	Temperature (C):	24, 31	Hardware ID:	58
Work time:	-	Up time:	0h 20m 29s	Features:	default
Device #1.3: HVFMC100					
Serial number:	XXXXXXXX-XXXXXX-XXXX-XXXXXX			(copy to clipboard)	
Status:	OK (33)				
Firmware:	144.30	Temperature (C):	24, 32	Hardware ID:	58
Work time:	-	Up time:	0h 20m 29s	Features:	default
Device #1.4: HVFMC100					
Serial number:	XXXXXXXX-XXXXXX-XXXX-XXXXXX			(copy to clipboard)	
Status:	OK (33)				

WARNING

The software is provided "as is", without warranty of any kind, express or implied, including but not limited to the warranties of merchantability, fitness for a particular purpose, and non-infringement. In no event will the authors or copyright holders be liable for any claim, damage, or other liability, whether in an action of contract, tort or otherwise, arising from, out of, or in connection with the software or the use or other dealings in the software.

The software sends anonymous usage data to the Motion Systems company. The data is used to improve the software and game profiles. The data is not used for advertising purposes.

4. MAINTENANCE AND CLEANING

INFO

Cleaning should be conducted every 160 working hours or once a month.

To see the working hours counter, go to **Tools and diagnostics** → **Devices**. It is displayed in the QS-CH2 device listing:

Device #1:			
Controller S/N:			(copy to clipboard)
Status:	OK		
Firmware:		Temperature (C):	N/A
Work time:	XXXXhXXmXXs	Up time:	
Paused:	no	Parking:	finished (normal)
		Hardware ID:	
		Features:	default
		Offline/Waiting:	no

To minimize the risk of abnormal heating that can result in system failure, keep the QS-CH2 uncovered, clean and dust-free. Cleaning the unit should be performed with a soft, dry cloth. **DO NOT** use solvents or cleaners that may corrode or damage materials of parts used in the QS-CH2 in any other way.

If any of the above mentioned elements is dirty or dusty use clean cloth to remove it. Isopropyl alcohol can be used to remove contamination caused by lubricants.

4.1. CHECKING MOTION LOCK BUTTON

At least once a month check if Motion Lock button is working correctly:

1. Before anyone steps into the platform - turn on the QS-CH2.
2. Push the red Motion Lock button. Device status will change:



3. The machine should stop and not react to any signal.
4. Turn on a simulation or a game to confirm that - with a correct profile activated proceed to a game or a simulation and engage movement.

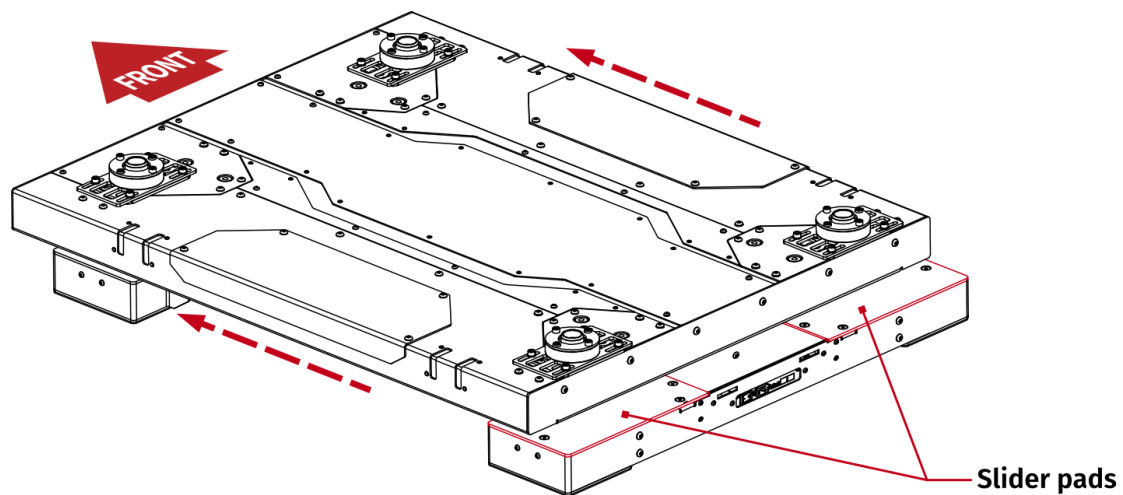
✓ If the Motion Lock Button works correctly - platform does not react nor move in any way.

✗ If the Motion Lock button does not work correctly - platform proceeds to simulate motion from the game/simulation. Check the cable connection and repeat the test. If the problem persists - **DO NOT** use the platform, power it off and contact technical support immediately.

4.2. GREASING THE SLIDER PADS

If the QS-CH2 will start emitting squeaky noises during operation - the device is not broken but needs to be greased.

1. In Platform diagnostics move the platform to maximum front position (surge slider).
2. Spray some penetrating oil on the rear metal pads.



3. In Platform diagnostics move the platform back and forth and to the sides (Yaw slider) so that it cleans the pads itself.
4. Wipe off penetrating oil residue and any dirt that will be moved to the edges of the pads with soft and dry cloth.
5. Use a **SMALL AMOUNT** of bearings grease (red, lithium based, NLGI-2) on back metal pads.
6. Move the platform back and forth and to the sides so it distributes the grease evenly and until the squeaks are gone.
7. Wipe off any grease residue collected on the sides with a soft and dry cloth.

INFO

Greasing process must be performed **ONLY** if QS-CH2 starts emitting squeaky noises.

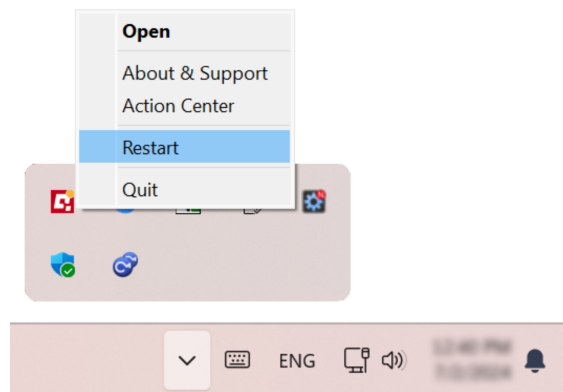
5. TROUBLESHOOTING

WARNING

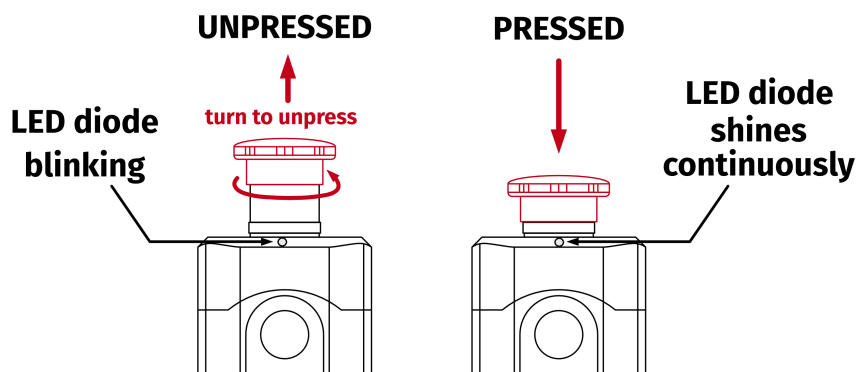
DO NOT attempt to do any repairs by yourself. It could be dangerous and will result in loss of warranty! Repairs should be consulted with technical support and then performed by a qualified technician.

Before contacting technical support, try this:

- Check Action Center in QubicManager.
- Check all cable connections in the device.
- Restart QubicManager application by right-click on the application icon in the system tray and selecting **Restart**:



- Check Motion Lock Switch position (should be unpressed to activate the motion):



- Try different USB ports (also try bypassing the USB hub by a direct PC connection).
- If a problem occurred abruptly, it could be caused by a thermal protection. Turn off the QS-CH2, disconnect it from power outlets and wait at least 15 minutes to let it cool down. Try turning it on again later.
- In case of any unclear electrical issues, strange behavior or abnormal work conditions, contact technical support.

5.1. QUBICMANAGER DEVICE STATUSES

-  **Status: Not connected** - no device is detected. If status appears while devices are connected - indicates that firmware update failed (requires firmware recovery) or M10 controller or USB connection is at fault. Check USB connection for loose connections, try different USB ports, bypass any USB hubs, swap USB cable for a different one.
-  **Status: Offline/Waiting for nodes (9)** - Power Cabinets are disconnected or not powered. If this status appears during operation - check power cords, power switches, CFG DIP switches configuration and M-BUS connection cables.
-  **Status: Running** - the device is in simulation/receives input signal.
-  **Status: Paused** - the device is paused (Pause button at the bottom of the QubicManager window).
-  **Status: EMCY/Motion-Lock (5)** - Motion Lock system has been triggered. Unpress the Motion lock button, check the Motion Lock button cable/connection. In a setup with no Motion Lock button - check the Motion Lock jumper.
-  **Status: Press and release Motion-Lock (9)** - the device is waiting for a cold start procedure (more details on page 11).
-  **Status: Pending Ref-Run (9)** - the device is performing calibration/reference run. **DO NOT** change the payload.
-  **Status: Parking/Centering** - the device is parking (the game/simulation was paused or no telemetry input is available).
-  **Status: Parked/Centered (5)** - the device achieved parking position and is in stand-by mode. It is powered, connected and ready to be operational.
-  **Status: Connected with issues** - there is an issue with the connection or power - check the working status in Tools and diagnostic → Devices.

INFO

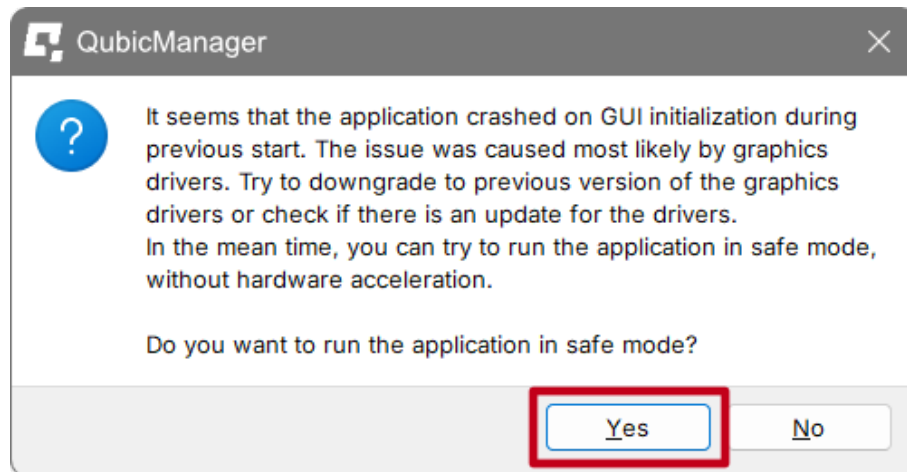
- **ALL** diagnostics and cable connection inspections **MUST** be performed with the device powered **OFF**.
- If any of error statuses persist after performing the troubleshooting steps - please contact technical support.

5.2. COMMON PROBLEMS WITH SOLUTIONS

- **Problem:** QubicManager software crashes on launch with an OpenGL error.

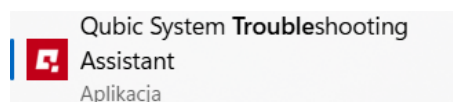
Solution long-term #1: This issue is caused by graphics drivers. Try to downgrade to a previous version of graphics drivers or check for updates.

Solution short-term: To open the app, click **OK** on all the operating system errors. Restart the QubicManager software and you will be presented with a window:

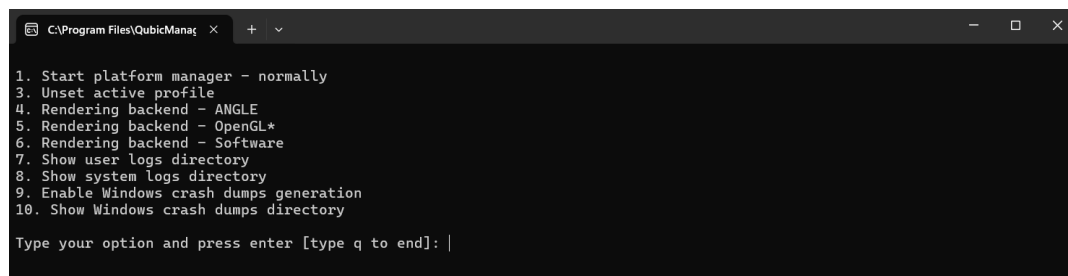


Click "YES" if you want run the application in Safe Mode (it will run a little slower).

Solution long-term #2: In order to overwrite the OpenGL rendering backend permanently, type in **troubleshooting** in Windows search bar. Select **Qubic System Troubleshooting Assistant**.



In the prompt window, type **6** on your keyboard and click **Enter**. Restart the QubicManager application.



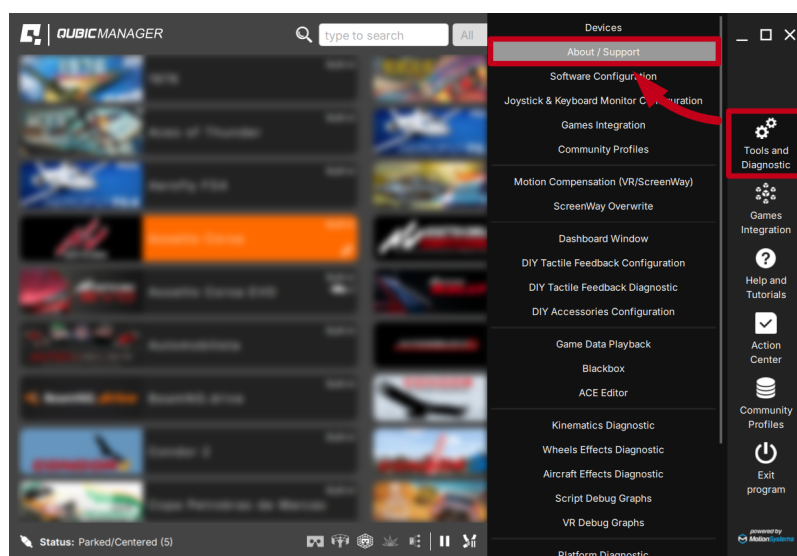
5.3. CREATING A SNAPSHOT

A snapshot is the easiest and fastest way to diagnose a problem. If you send in the zip file generated in the snapshot menu along with a description of the problem, technical support receives all the necessary information about the product and its configuration. It can be then analyzed to provide the best solution.

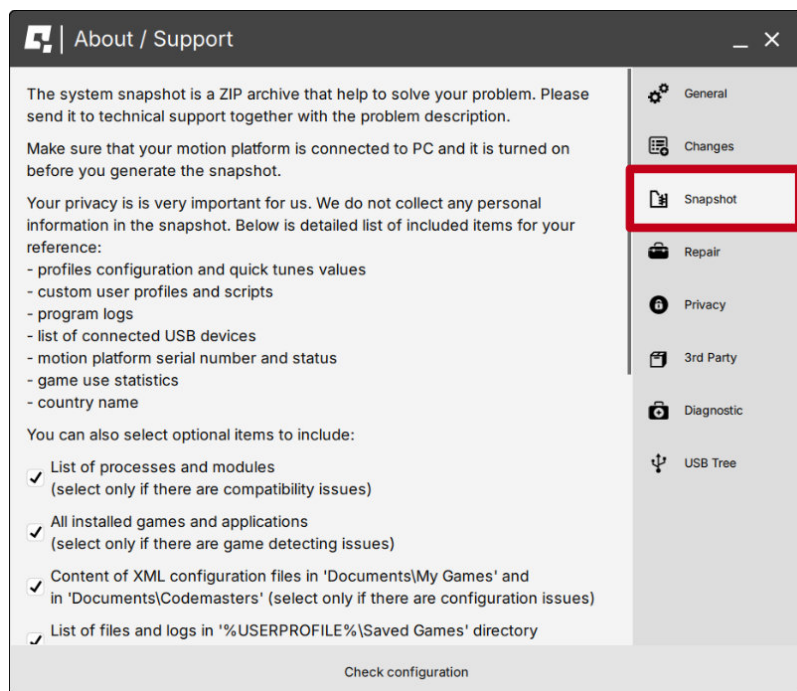
INFO

The QS-CH2 and all interconnected Power Cabinets **MUST BE** be powered up when creating the snapshot.

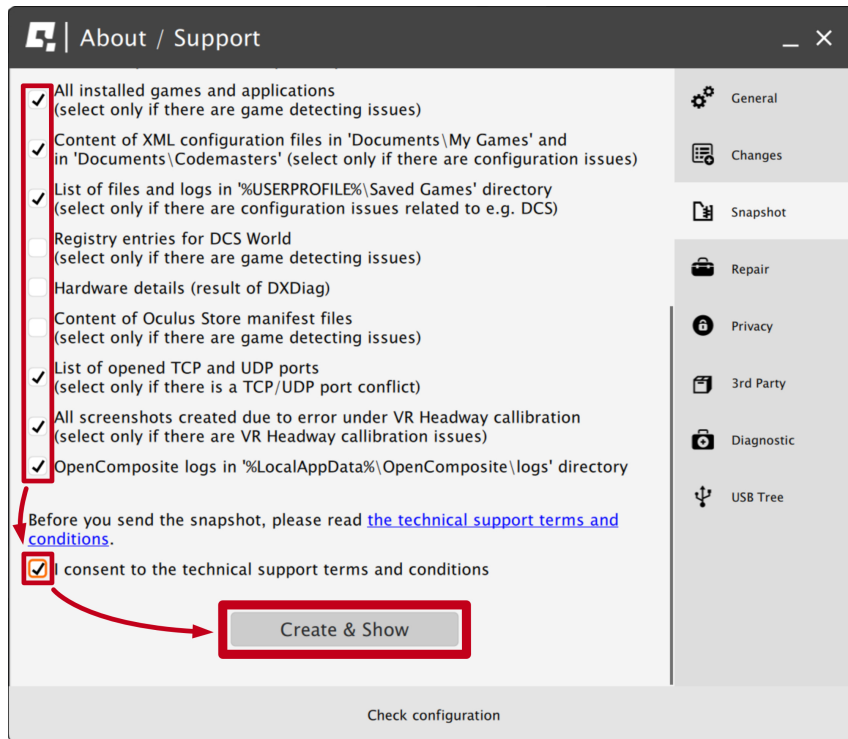
1. Open the main window of the QubicManager application.
2. Go to **Tools and Diagnostic** → **About / Support**.



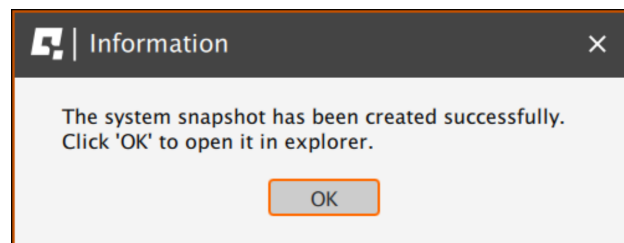
3. Open the **Snapshot** window:



4. Select data that will be included in the snapshot.
5. Scroll down, consent to the technical support terms and conditions and select **Create & Show**:

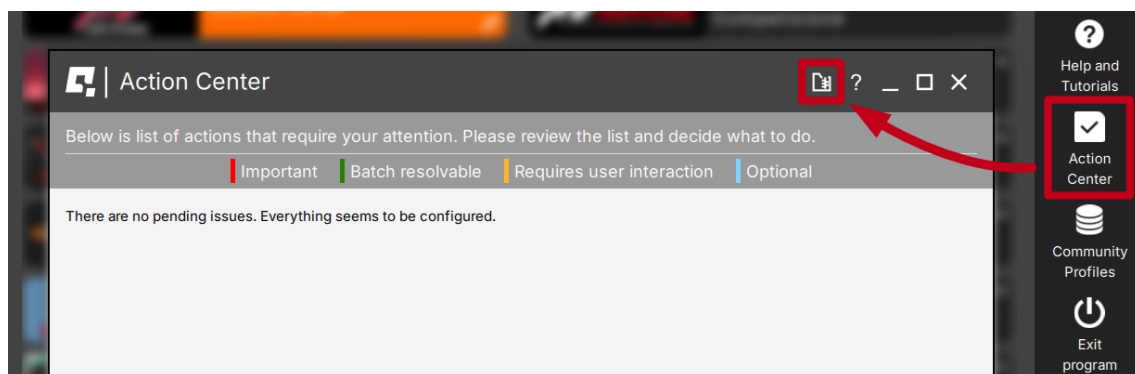


6. The snapshot has been created, click the **OK** button - the folder with the snapshot ZIP file will open.



7. Attach the snapshot ZIP file to your support request.

Alternatively, click Snapshot icon in the top-right corner of the Action Center:



5.4. DISCORD CHANNEL

We strongly recommend joining our discord channel, where our growing community is sharing amazing tips and ideas of how to set up, use and tune the Qubic System products. You can also send questions for our staff or get answers directly from the community.

Join our discord channel by following the invitation link:

QubicSystem.com/Discord



6. ADVANCED APPLICATIONS

INFO

Examples shown in this section describe optional application of external safety and power cut-off devices. If you wish to expand the functionality of your motion system, read the whole section to have a good understanding of how to apply and what functionality to expect. Apply at your own discretion.

WARNING

Motion Lock input is not a SIL/PL (safety integrity level/performance level) rated and **DOES NOT** guarantee safety. If you wish to achieve specific SIL/PL ranking, consider introducing a power cut-off device that is controlled by an external safety relay and cuts off the power to all QS-SB2. Example application of the power cut-off contactor can be found in section **6.3.2** and **6.3.3**.

INFO

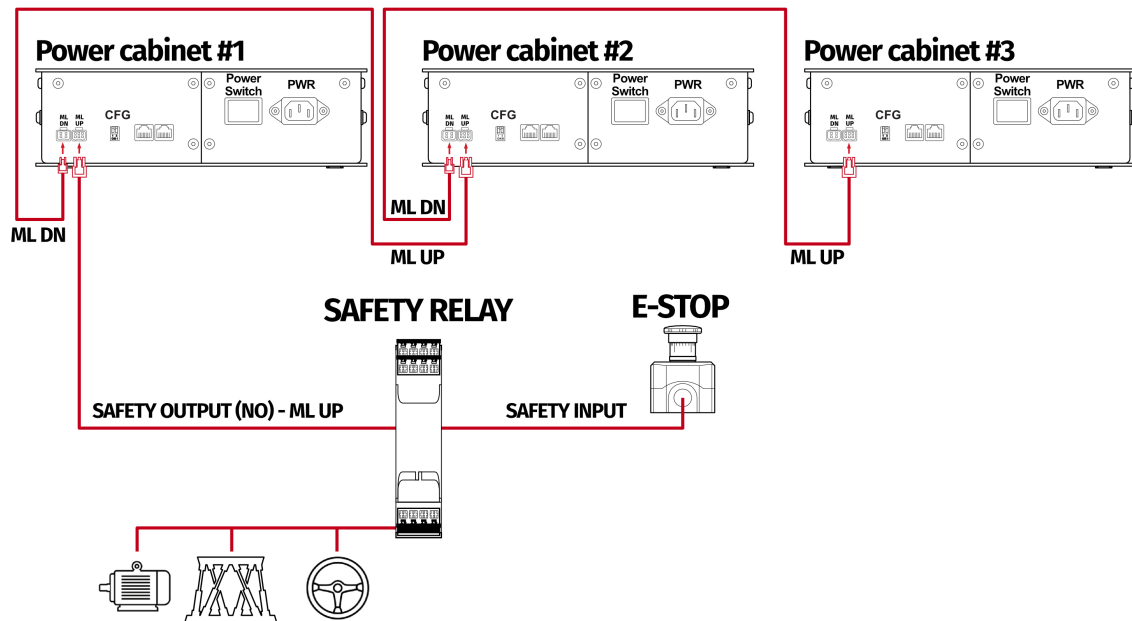
When applying safety relay to the Motion Lock :

- Use input cables according to your safety relay manual.
- Use output cables according to your safety relay manual and cross section no less than 0,75 mm²
- Implementing an additional safety relay requires deactivating Motion Lock cycle procedure at the power up. In order to do that, go to "Tools and diagnostics" → "Devices" → click "Quick codes" next to a "HVFMC200" item → enter code "7c2f47a2" → click "Execute" → wait for the operation to finish → repeat for every HVFMC200 with an unique Serial Number (every second item).

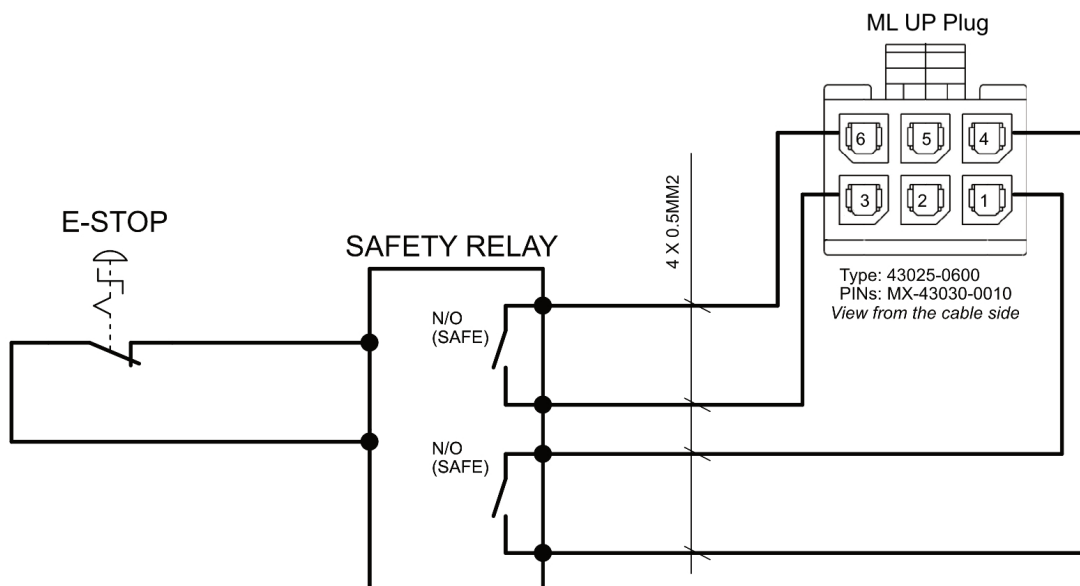
6.1. ADDING ADDITIONAL DEVICES TO THE MOTION LOCK CIRCUIT

If there is necessity to stop other devices, apart from the QS-CH2, ML (Motion Lock) and additional user devices can be controlled by safety relay outputs. In the example application, the E-STOP button is connected to the external safety relay. When the E-STOP is triggered, the safety relay will activate the Motion Lock function, which will stop motion of the platform and additional devices.

Example application of single-channel safety relay that controls ML and additional devices:



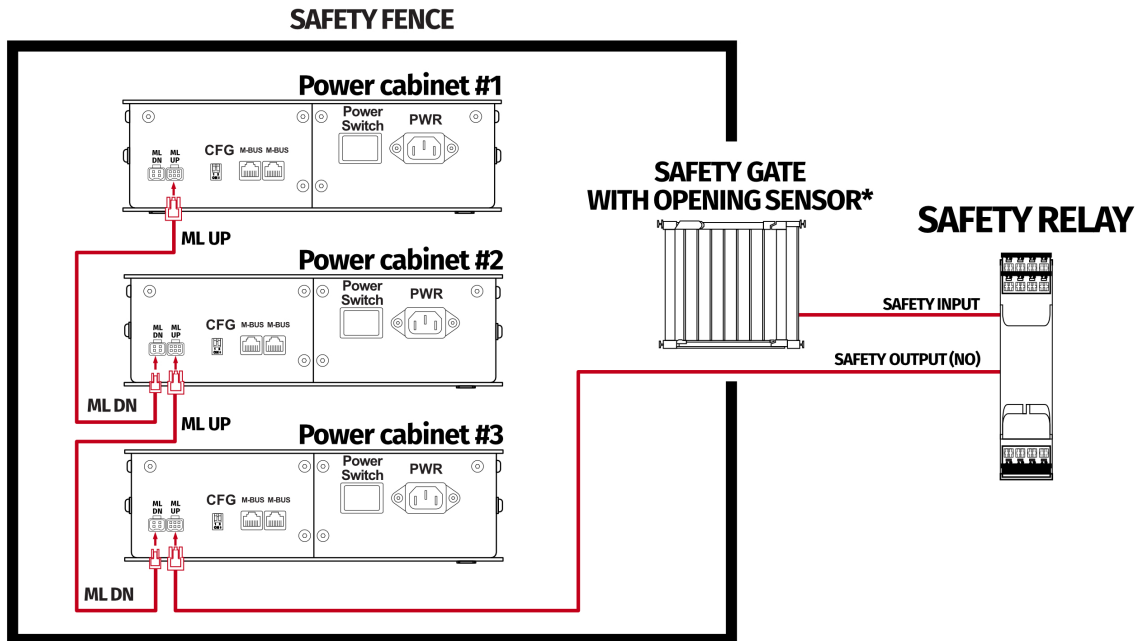
Example wiring diagram of application of one-channel safety relay with E-STOP button:



6.2. IMPLEMENTING THE WORKING ZONE PROTECTION

To protect bystanders from accidental hit from moving parts of the platform, safety gate with opening sensor* can be connected to safety relay input for activating ML function. When the gate opens, the safety relay output activates the ML (Motion Lock) function and stops the motion of the platform.

Example application of safety gate opening sensor:



*Check your safety relay manual for list of applicable sensors

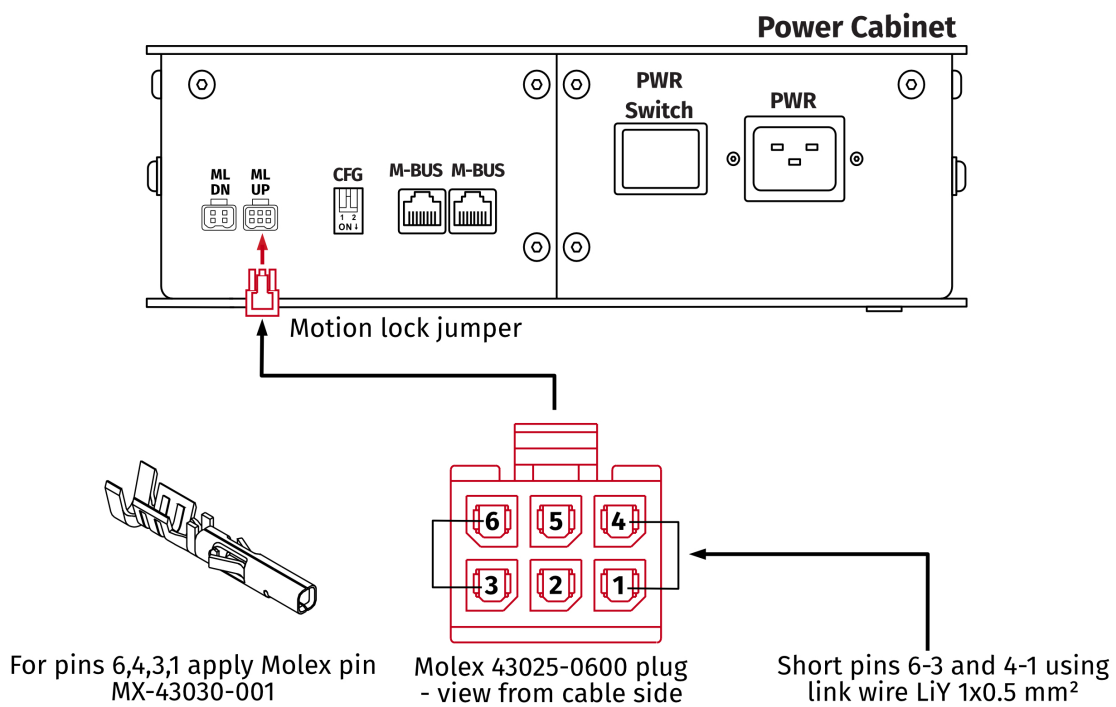
6.3. INCREASING SAFETY LEVEL

WARNING

Modifications of the safety system, involving application of the power line contactors, shall be performed only by somebody competent. A competent person is a qualified and knowledgeable person, who because of their training and experience has the knowledge required to apply those changes. It is user responsibility to commission modification of the safety system to a competent person, experienced with industrial wiring practices, which will be required to undertake the installation. Commissioning shall be undertaken by a trained electrical technician experienced in safety installations.

6.3.1 ASSEMBLING MOTION LOCK JUMPER

To apply solutions which require using power line contactors, Motion Lock connection cables in the QS-SB2 power cabinet needs to be replaced with jumpers. To prepare a jumper, you need to assemble recommended connector as shown below:



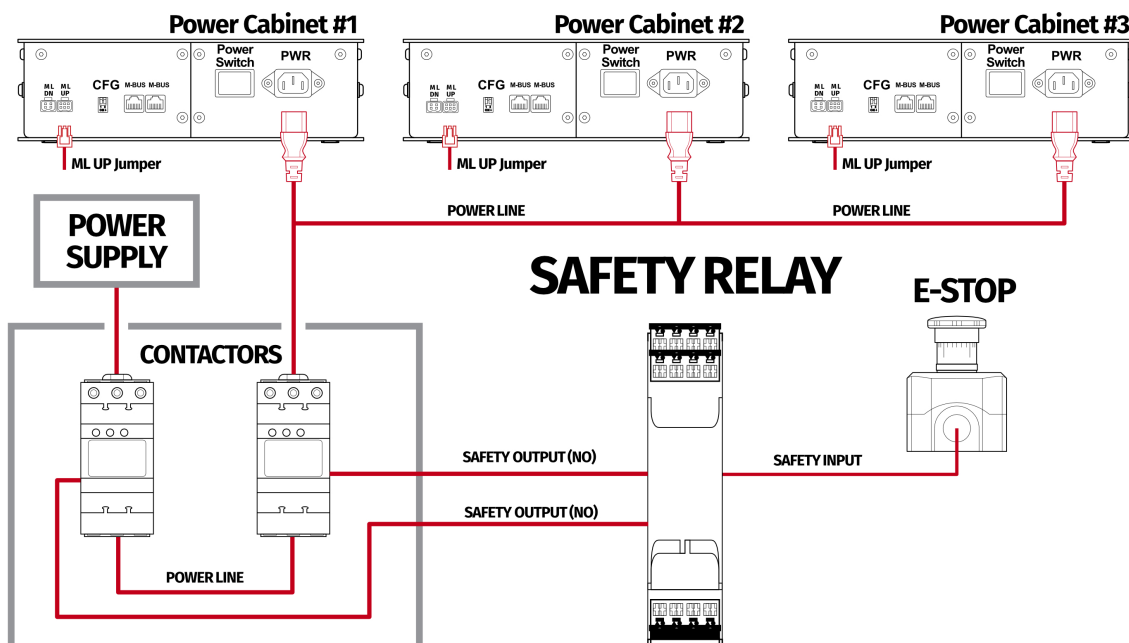
6.3.2 ADDING POWER-CUT CIRCUIT WITH E-STOP BUTTON

If specific SIL/PL rated level needs to be achieved, it might be necessary to install a power cut-off device. Two contactors connected in series and controlled by safety relay can be used to provide or cut-off power line to QS-SB2 power cabinets. When safety function on safety relay input is triggered, a safety relay will switch off the contactors, thus cutting-off the power to the platform. To apply this solution, ML UP connection cables needs to be replaced with prepared jumper as described in section 6.3.1.

INFO

To achieve required safety performance level it is necessary to perform safety risk assessment at user site.

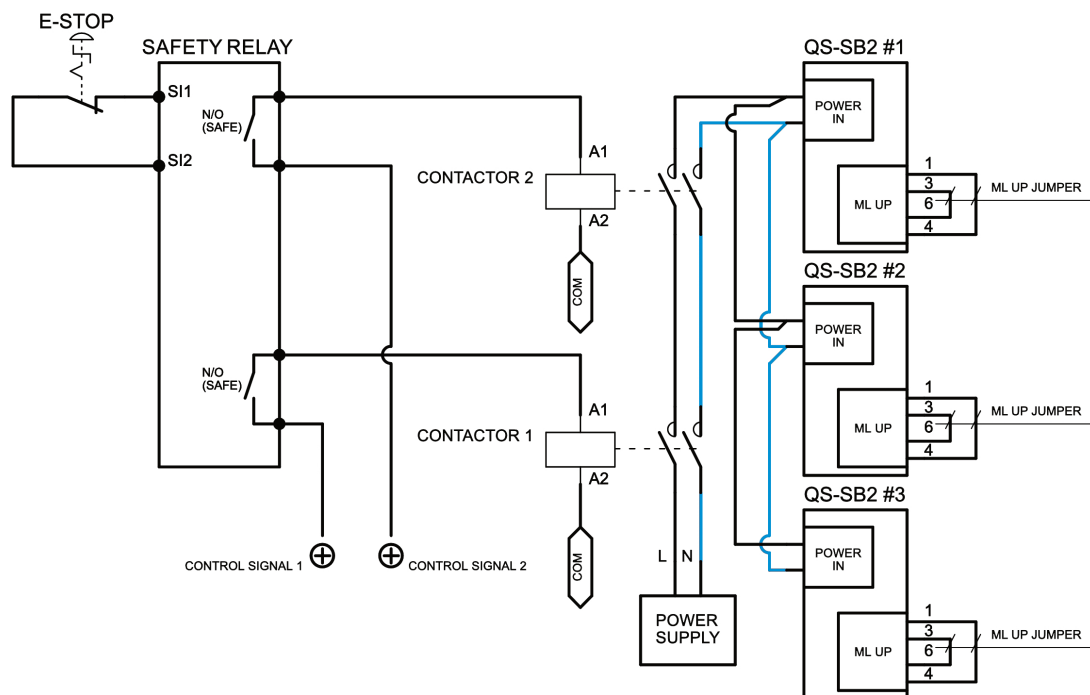
Example application of power line contactors and E-STOP button:



INFO

In order to increase SIL/PL level it's a good practice to apply well-known contactors of two different manufacturers in order to decrease probability of failure resulting from serial production.

Example wiring diagram of application of power line contactors and one-channel safety relay with E-STOP:



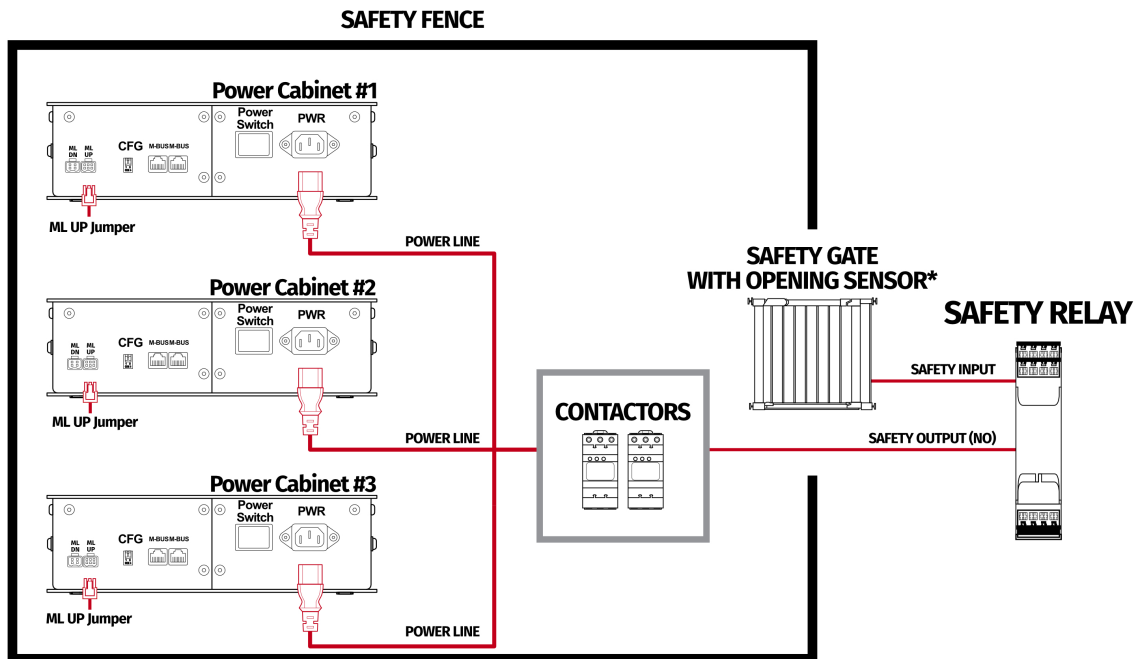
INFO

PE (protective grounding/earthing) connection is omitted for better transparency

6.3.3 IMPLEMENTING THE WORKING ZONE PROTECTION WITH POWER-CUT CIRCUIT

In example application contactors connected in series provide power line to the QS-SB2 power cabinets. When safety function on safety relay input is triggered, a safety relay will switch off the power contactors, thus cutting-off the power to the platform.

Example application of power line contactors with safety gate opening sensor:



*Check your safety relay manual for list of applicable opening sensors

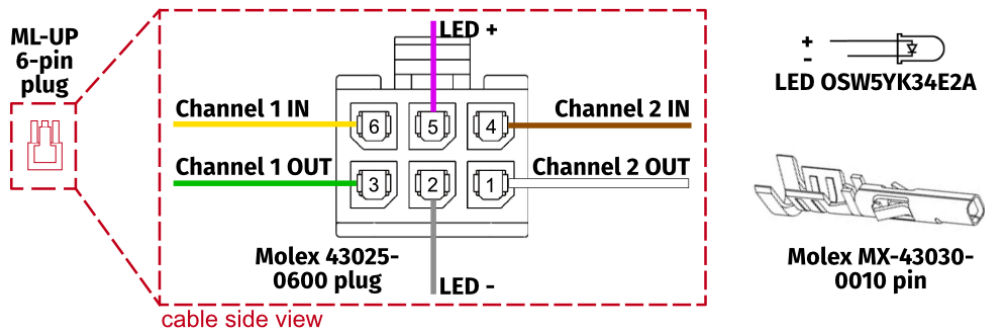
INFO

When applying safety relay and contactors to the power line remember to:

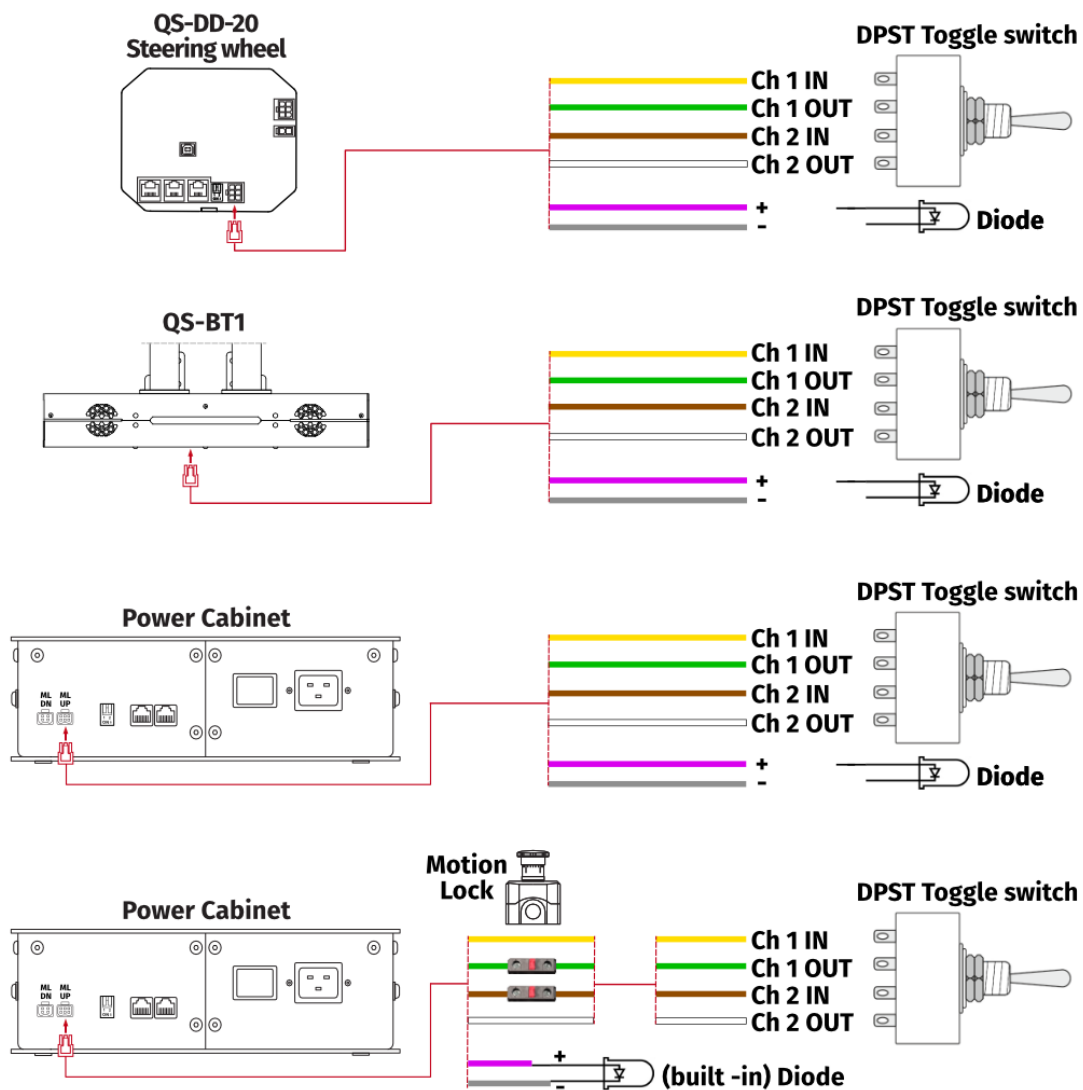
- Use control cables according to your safety relay manual
- Power line cables shall be chosen accordingly to power requirements of motion system. See power requirements of specific motion system.

6.4. IMPLEMENTING NON-FACTORY MOTION LOCK SWITCH

For non-factory Motion Lock plug setup, you must assemble plug and connectors as shown below:



If you want to assemble custom Motion Lock switch or a button box setup (only Double Pole Single Throw switch compatible) using QubicSystem Motion Lock interlink cable, follow the diagrams below:



7. CONFORMITY INFORMATION



The QS-CH2 meets the requirements of CE marking and relevant regulations of the EMC Directive 2014/30/EU.



The QS-CH2 meets the requirements of FCC 47 CFR Part 15, Class B digital device.

8. ENVIRONMENTAL IMPACT AND DISPOSAL



DO NOT dispose of this product with standard household waste but drop it off at a collection point for the disposal of Waste Electrical and Electronic Equipment for recycling.

QS-CH2 is shipped with wooden cases/cardboard boxes. If the packaging is no longer needed, it can be fully recycled.

QS-CH2 is an advanced device and if stored or disposed of incorrectly it could harm the environment or/and other people. When the device is no longer in use it should be disposed in environmental safe manner in compliance with applicable local work and environmental protection regulations. If no other agreement of disposal was concluded, the device shall be dismantled for disposal as follows:

- Metal parts should be scrapped.
- Electric and electronic components should be disposed of in the specialized disposal center.
- Other materials should be sorted and disposed of accordingly to the local law and regulations.

9. LIABILITY DISCLAIMER

If permitted under applicable law, Motion Systems and its subsidiaries disclaim all liability for any damages caused by one or more of the following:

- The product has been modified, opened, or altered.
- Failure to comply with assembly instructions.

-
- Inappropriate or abusive use, negligence, an accident (an impact - for example).
 - Normal wear.

INFO

If permitted under applicable law, Motion Systems and its subsidiaries disclaim all liability for any damages unrelated to the material or manufacturing defect with respect to the product (including, but not limited to, any damages caused directly or indirectly by any software, or by combining the QS-CH2 with any unsuitable element or other elements not supplied or not approved by Motion Systems for this product).

10. WARRANTY

Motion Systems warrants to the consumer that this product shall be free from defects in materials and workmanship, for a warranty period which corresponds to the time limit to bring an action for concerning this product.

For commercial customers there is a one (1) year limited warranty, starting on the original date of purchase.

For non-commercial customers there are two (2) years warranty, starting on the original date of purchase.

Within the warranty period, the product will be repaired or replaced free of charge, excluding shipping charges.

This warranty shall not apply:

- If the product has been modified, opened, altered, or has suffered damage as a result of inappropriate or abusive use, negligence, an accident, normal wear, or any other cause unrelated to a material or manufacturing defect (including, but not limited to, combining the QS-CH2 with any unsuitable element, including in particular power supplies, chargers, or any other elements not supplied or approved by Motion Systems for this product).
- In the event of failure to comply with the instructions provided by technical support.
- To software (said software being subject to a specific warranty).
- To accessories (cables, cases, for example).
- If the product was sold at public auction or if the product has suffered damage as a result of force majeure: flood, fire, earthquake, storm.

This warranty is non-transferable. No new warranty period commences if the product is repaired or replaced. Your statutory rights towards the seller are not affected or restricted by this warranty. Motion Systems, and their partners are not liable for any indirect, incidental, or punitive damages from use of this product. In case of malfunction during the warranty period immediately contact technical support.

11. COPYRIGHT

Qubic System is a trademark of Motion Systems. All rights reserved.

All the contents in this user manual are the intellectual property of Motion Systems. No part of this manual, including the products and software described in it, shall be modified or translated into any language without the prior written permission of Motion Systems. Specifications and information in this manual are subject to change at any time without obligation to notify any person of such revision or changes. Illustrations are not binding.

INFO

Trademark Notice - All brand names, icons, and trademarks that appeared in this manual are the sole property of their respective holders.

12. MANUFACTURER INFORMATION

Qubic System is a brand
that belongs to **Motion Systems**

HQ address:
Miedziana 7 Street
55-003 Nadolice Wielkie
Poland



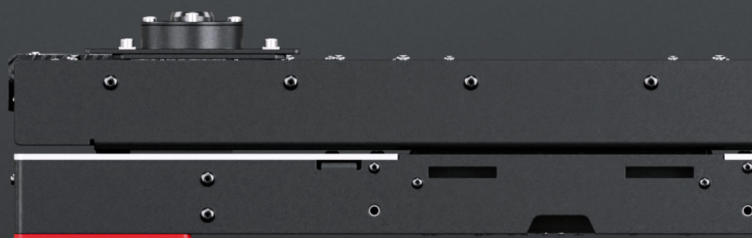
Motion Systems homepage



QubicSystem homepage

INFO

In support queries please contact your reseller.



Q5 / CH2