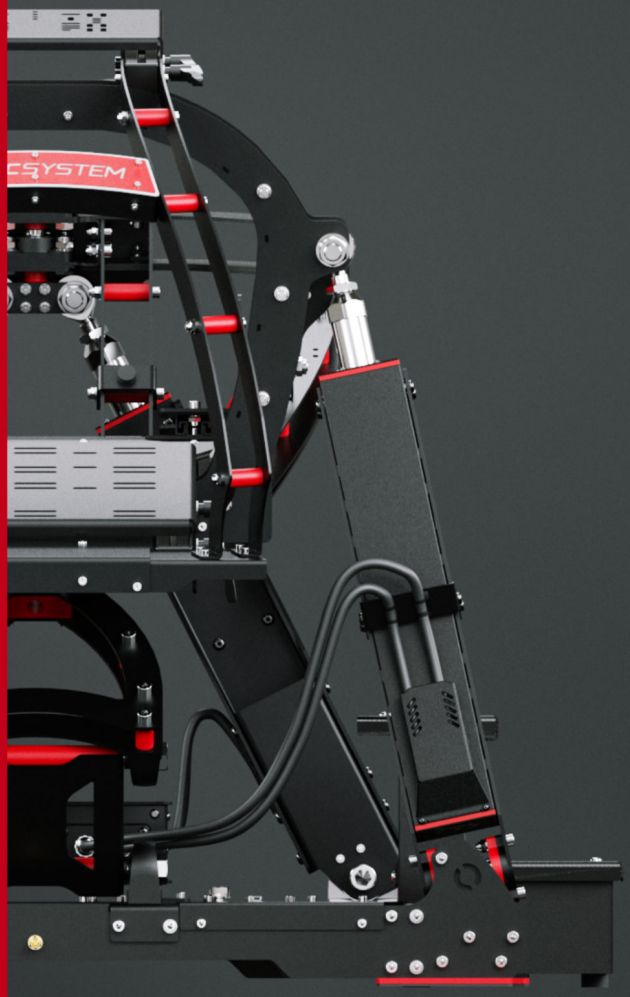
TRACTION COMPLETELY CONTROLLED

EN

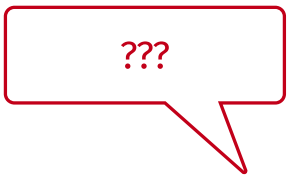
USER MANUAL



QS V20

The Motion Systems, manufacturer of Qubic System, would like to thank you for choosing the QS-V20, an innovative product that helps you 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**

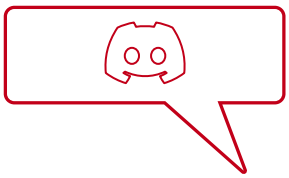
Our experts are ready to assist you:
MotionSystems.eu/Support

SEARCH OUR **TUTORIALS**

Everything you wish to know is here:
QubicSystem.com/Tutorials

SUPPORTED **GAMES**

Racing games and professional simulation software:
QubicSystem.com/Supported-Games



DISCORD **YOU ASK, WE ANSWER**

Join our discord server to ask questions:
QubicSystem.com/Discord

Contents

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-V20 (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-V20.
Dangerous voltages level can be present in Power Cabinet for a few minutes after turning off the machine.

WARNING

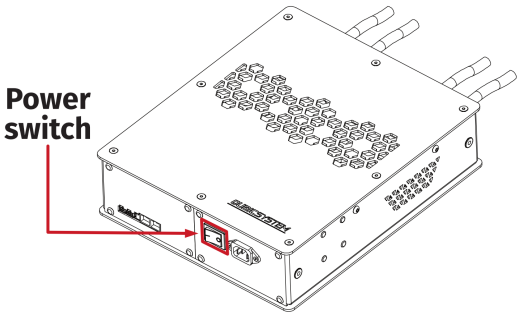
The device is intended solely for individuals **OVER THE AGE OF 16**. In case of use by individuals with limited physical, sensory, or mental capabilities, strict supervision is required. Read safety instructions before using the device.

To reduce the risk of burns, fire, electrical shock, injury or mechanical damage:

- Use the QS-V20 only for its intended purpose, according to instructions.
- Unplug the QS-V20 from the power supply if it is not used for an extended period or when there is a need to perform hardware installation, maintenance, servicing or repairs.
- Turn off the QS-V20 when it is not in use.
- The QS-V20 was designed for indoor use only - **DO NOT** store or use the product outdoors.
- Keep the QS-V20 away from the heat sources, high humidity, water, and other liquids. **DO NOT** store in cold place where water condensation may occur.
- **DO NOT** disassemble the product. Any tampering with or altering the product will void the warranty, poses a serious risk of electric shock, and may irreparably damage the product.
- **DO NOT** cover the ventilation holes in the Power Cabinet.
- Keep the power cord plug and the socket dry, clean and dust-free.
- Protect the power cord from damage caused by being stepped on, rubbed against, or pinched.
- **DO NOT** use the QS-V20 if the ambient temperature is below 5° Celsius (41° Fahrenheit) or above 40° Celsius (104° Fahrenheit).
- **DO NOT** use the QS-V20 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 power cord, use only certified products with the same rating as the one being replaced.
- Connect the QS-V20 to a properly grounded outlet only and ground the cockpit to facility's solid protective earth/ground. See section 3.6 on page 23 for details.
- If you want to increase safety level of the system, you can add external safety devices. For detailed information check section **6** on page **42**.

WARNING

Always turn all the power switches **OFF** on the QS-SB2 power cabinets before plugging and unplugging the QS-V20. Dangerous voltages level can be present in Power Cabinet for a few minutes after turning off the machine.



WARNING

Stop using the QS-V20 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

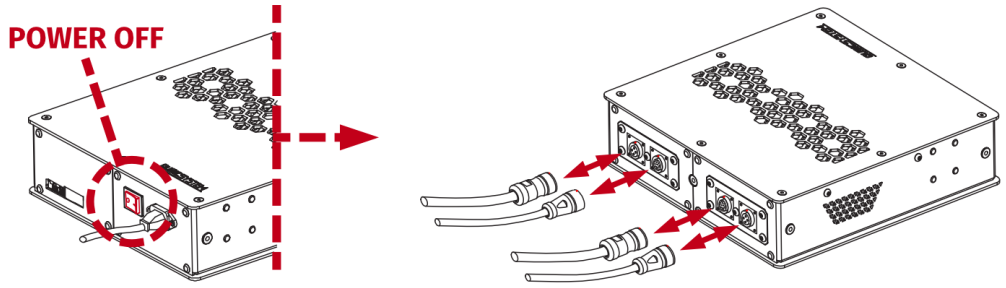
WARNING

As with any mechanical device, user is the one responsible for inspecting the condition of the machine before using it and ensuring safe working conditions.

The safety of Qubic System users is top priority. To protect users and bystanders from injuries caused by mechanical parts movement and electric shock, the following instructions **MUST BE** followed.

WARNING

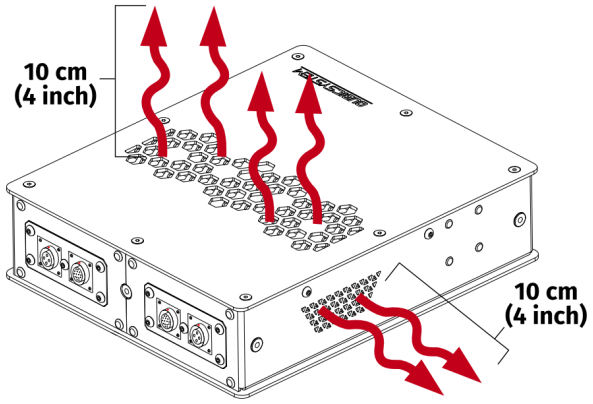
Plugging and unplugging the actuator must **ALWAYS** be performed with Power Cabinet's power switched OFF.
For more information go to section **3.7** on page **23**.



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.

1.2.1 BEFORE START

- Ensure that nothing is blocking machine's movements or air vents. The minimum distance between the air vents in the Power Cabinet's and any outside part of the cockpit equipment is 10 cm (4 in).



- Check if cables are mounted correctly – they must **NOT** be stretched or loosely connected to the socket. Placed them out of the moving range of the device components.
- Check if all components are correctly mounted.
- Check if there are no sharp edges near the moving range of the cockpit.

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.

Even though possibilities with QS-V20 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.

- Ensure that power supply in your facility meets requirements listed in section **2.5**.
- **DO NOT** use the QS-V20 on very soft or fragile surfaces like rubber, glass, or foam.
- Ensure that all QS-V20 modules are mounted properly.
- **DO NOT** mount the rig in tight or cluttered spaces – remember that QS-V20 moves and nothing should restrict its motion range.
- Unbolt the transportation wheels on front and back side of the QS-V20 before starting simulation. **DO NOT** use the platform with attached transportation wheels.
- 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-V20 in an unusual application, and you are not sure, that the desired setup is feasible, please contact, the distributor/reseller.
- 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 (safe distance is minimum 1.5 m).
- When the QS-V20 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 **16**.

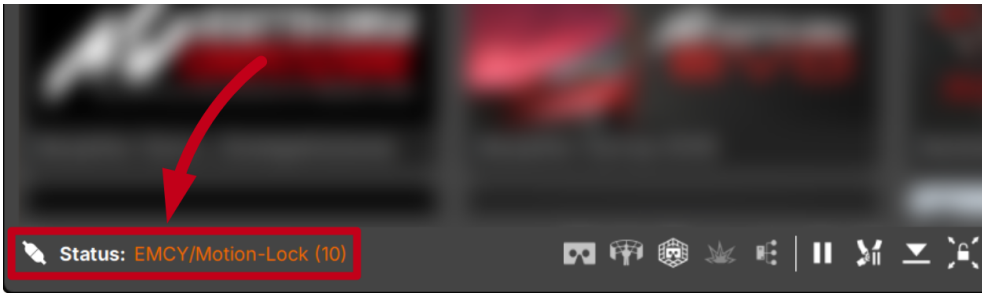
WARNING

In order to perform a calibration, QS-V20 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-V20 during the calibration run.
- 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 35.
- 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-V20 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:



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 **46** and **48**.

- 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-V20.
  - 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

Check if 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.

- **STOP USING** the QS-V20 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** pull the wires connecting the actuators with the power cabinets.

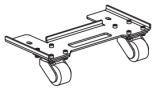
WARNING

NEVER unplug the actuator with Power Cabinet's power ON, because the actuator will **launch upwards abruptly**.

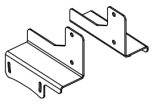
2. PRODUCT DESCRIPTION

The QS-V20 is an extended 4DoF motion cockpit, designed for pro racing car simulation, dedicated to both drivers training and sim racing enthusiasts. The motion system based on world's fastest linear actuator's technology provides incredible levels of vehicle feedback to the driver. This motion platform is suitable for Rally, GT and F1 simulations, also the small footprint and lightweight design allow to fit the machine to every racing room.

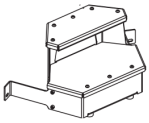
2.1. SYSTEM COMPONENTS



2 x
Wheel module



1 x
Direct drive
base bracket



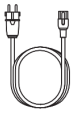
1 x
Steps

1 x
Motion lock switch
(connected)

1 x
M10
controller

1 x
M-BUS
communication
cable

1 x
USB cable



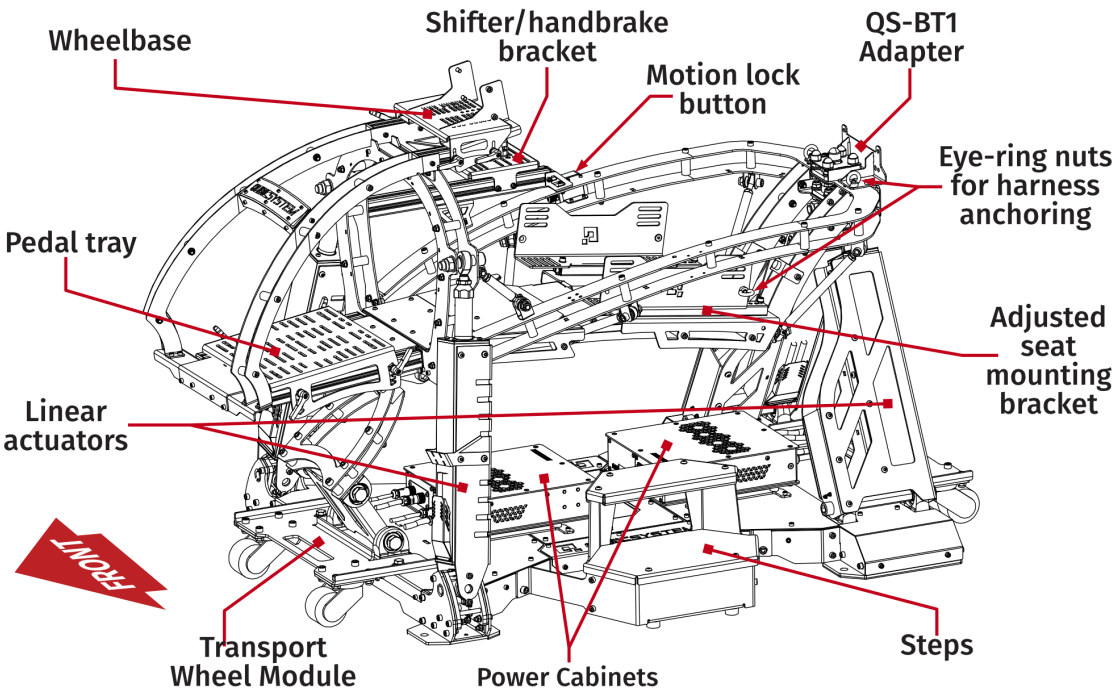
2 x
Power
supply
cable

1 x
Motion Lock
interlink
cable
(connected)

1 x
M-BUS
terminator
(connected)

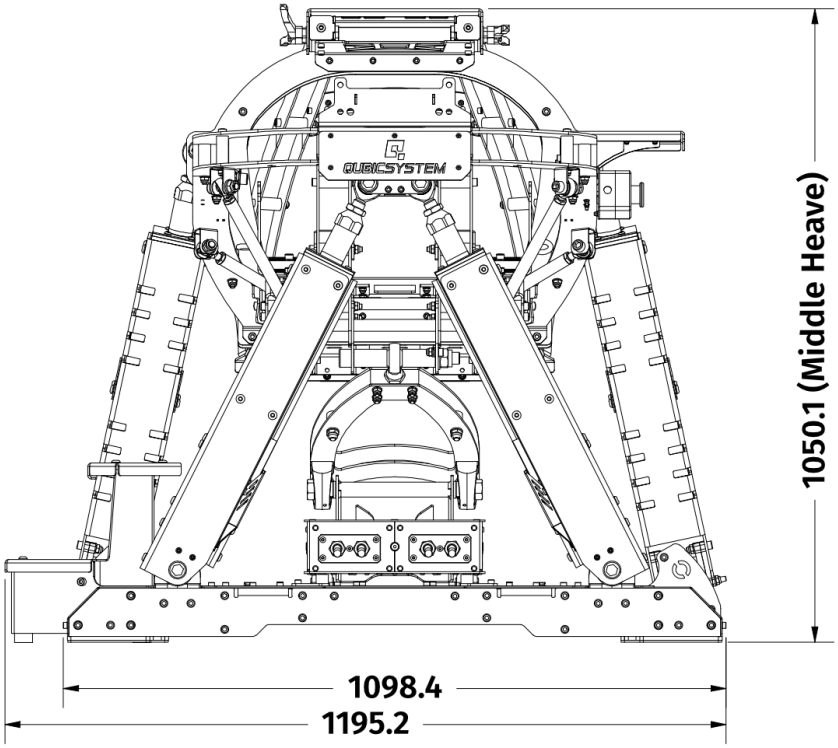
1 x
M-BUS
communication
cable
(connected)

Complete overview:

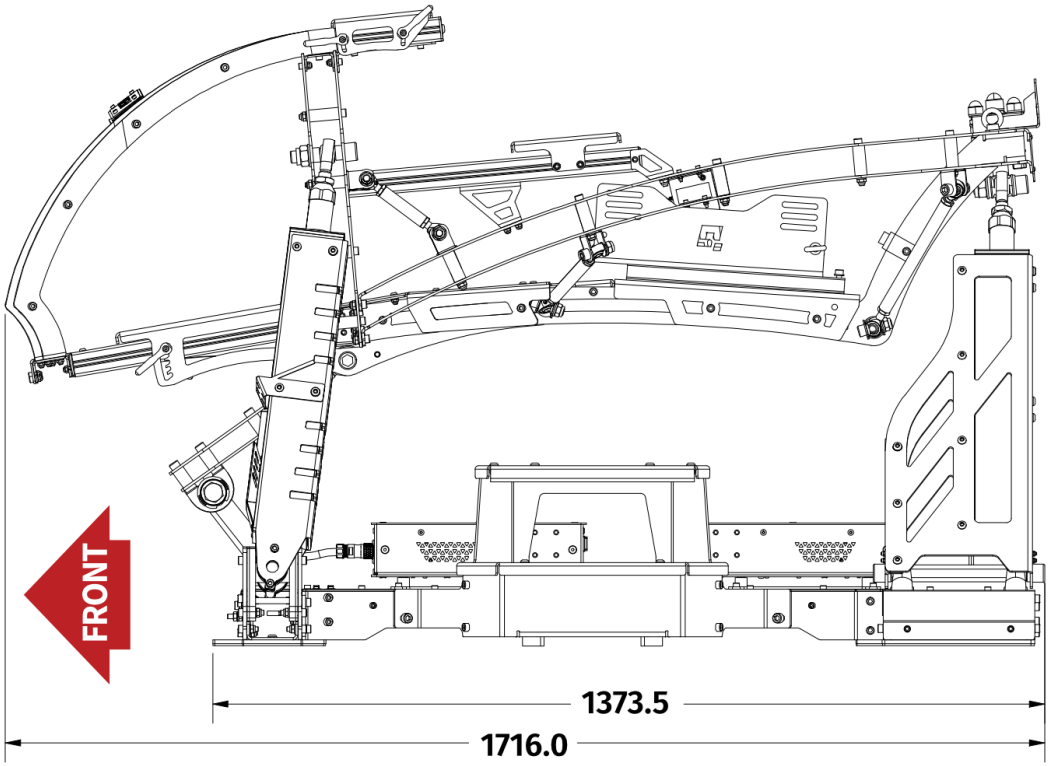


2.2. DIMENSIONS

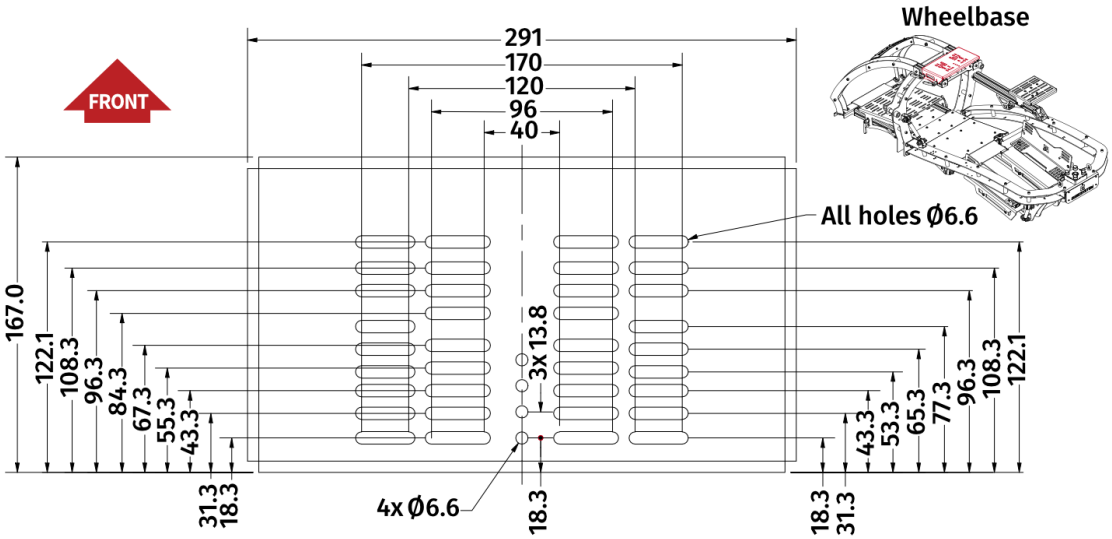
Rear side view

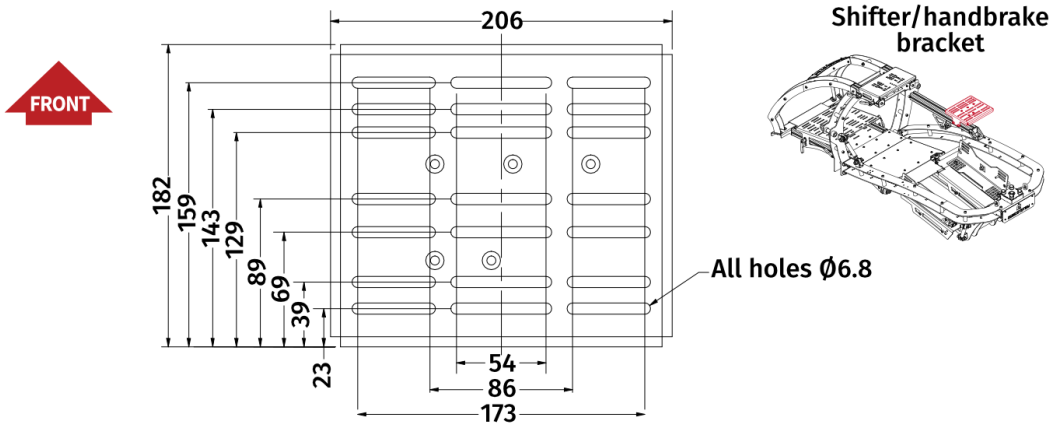


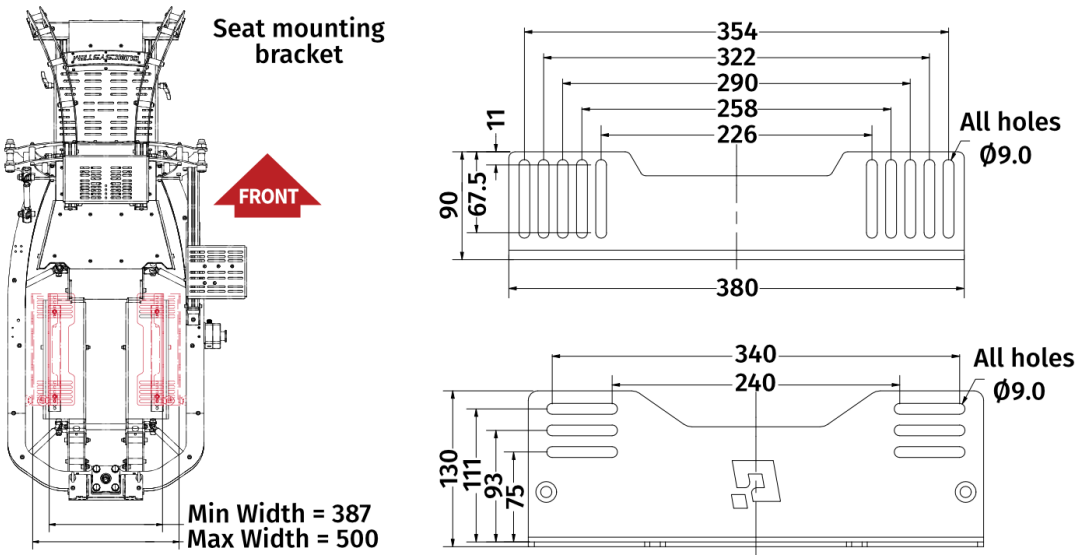
Side view

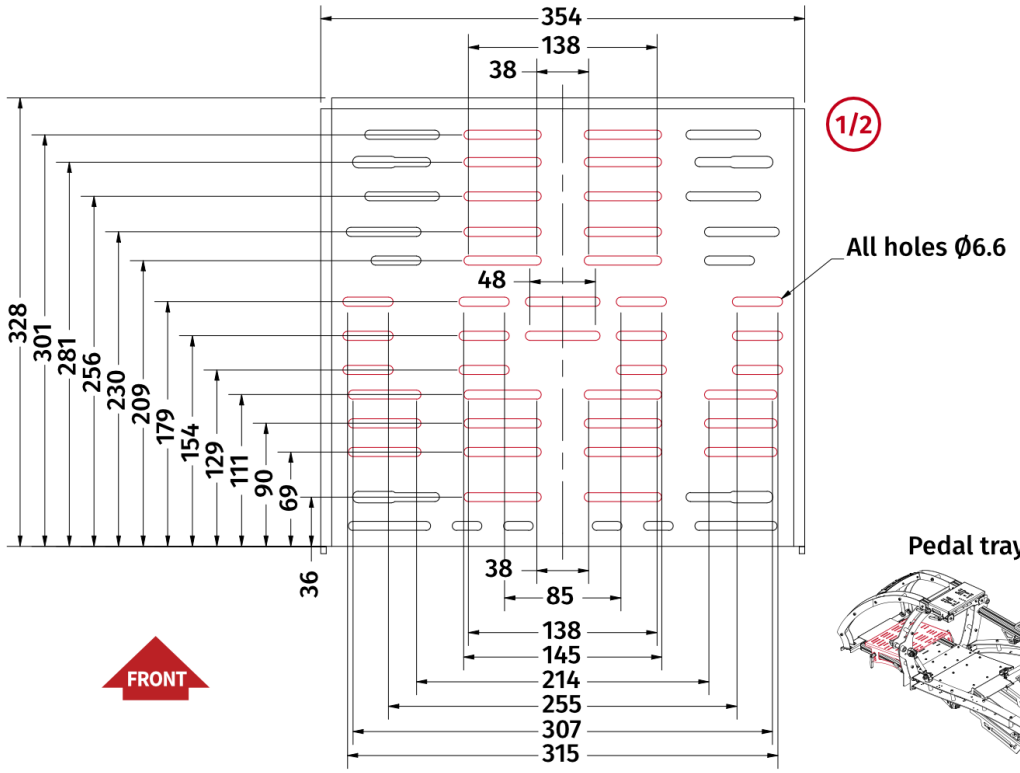


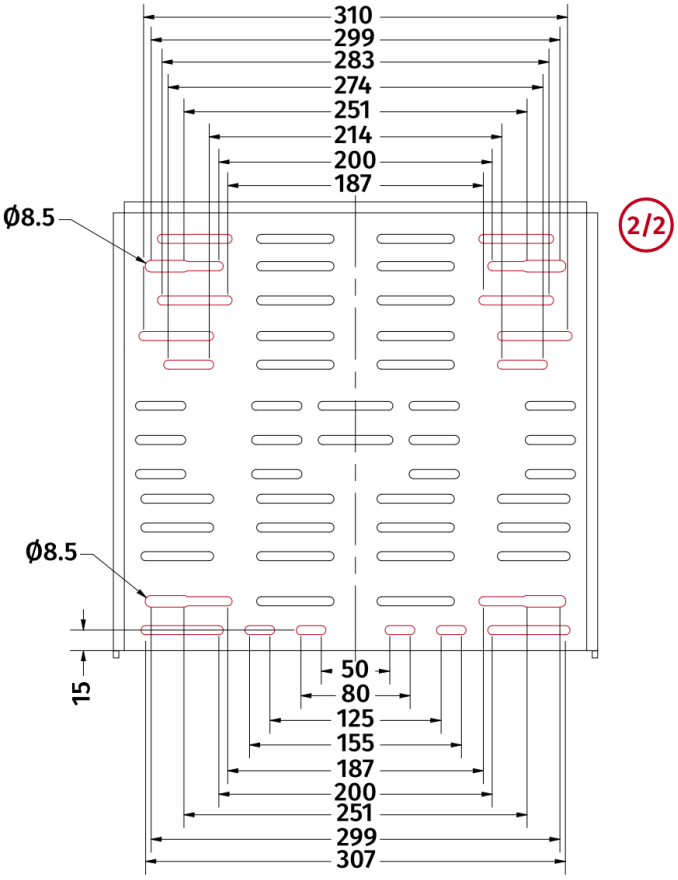
2.2.1 ACCESSORIES MOUNTING HOLES DIMENSIONS








354
138
38
1/2
All holes Ø6.6
48
328
301
281
256
230
209
179
154
129
111
90
69
36
38
85
138
145
214
255
307
315
FRONT
Pedal tray


310
299
283
274
251
214
200
187
Ø8.5
2/2
Ø8.5
15
50
80
125
155
187
200
251
299
307

2.3. SYSTEM SPECIFICATION

QS-V20 motion system	
Architecture	4DoF (3DoF + traction loss)
Actuator stroke	100 mm
Product weight	280 kg
Max user weight	150 kg
Vibration frequency range	0-100 Hz
Maximum control frequency	1000 Hz
Excursions	
Heave	-51.8 mm, 51.5 mm
Roll	-7.6°, 7.6°
Pitch	-5.5°, 5.5°
Yaw (rotation point at the front actuators)	-6.1°, 6.1°

2.4. SYSTEM PERFORMANCE

The operating mode of the system can be changed as desired in QubicManager. System performance will change depending on the selected mode. There are three modes available:

Q-MODE 230V		
	Velocity	**Acceleration**
Heave	0.9 m/s	8.8 m/s^2
Roll	140° /s	1500° $/s^2$
Pitch	40° /s	500° $/s^2$
Yaw	75° /s	900° $/s^2$

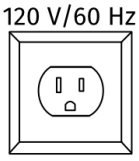
PERFORMANCE MODE 230V		
	Velocity	**Acceleration**
Heave	0.5 m/s	5.9 m/s^2
Roll	80° /s	1200° $/s^2$
Pitch	28° /s	380° $/s^2$
Yaw	50° /s	710° $/s^2$

HEAVY DUTY MODE 230V		
	Velocity	**Acceleration**
Heave	0.35 m/s	2.5 m/s^2
Roll	60° /s	450° $/s^2$
Pitch	20° /s	150° $/s^2$
Yaw	35° /s	280° $/s^2$

2.5. POWER REQUIREMENTS

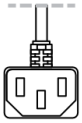
QS-V20 requires a 120/230±10% VAC 50-60 Hz single phase with ground and neutral connection.

USA/CAN
120 V/60 Hz



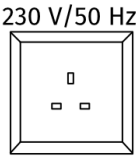
Type B plug
Nema 5-15p

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

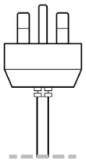


C13 IEC-60320

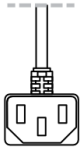
UK
230 V/50 Hz



Type G plug
BS 1363 P3

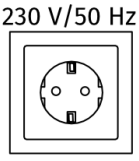


Rated for
250V/10A
3x 0.75 mm2

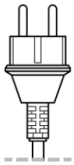


C13 IEC-60320

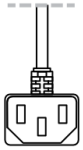
EU
230 V/50 Hz



Type F plug
CEE 7/7



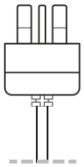
Rated for
230V/10A
3x 0.75 mm2



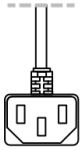
C13 IEC-60320

AU
230 V/50 Hz

Type I plug
AS/NZS-3112-1



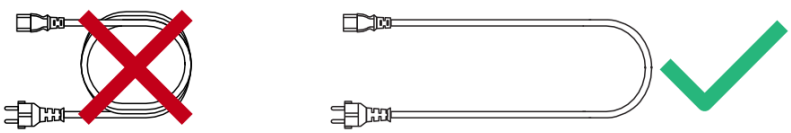
Rated for
230V/10A
3x 18 AWG



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.

WARNING

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

Tables below contain power consumption data for QS-V20:

230V ±10% 50-60Hz Single phase	HEAVY DUTY	PERFORMANCE	Q-MODE
Average power consumption - stress test [W]	300	400	600
Average power consumption - typical game [W]	80	80	80
Peak power for converter specification [kVA]	1.2	1.4	3.1
Average power for converter specification [kVA]	0.6	0.9	1.6
Peak current for breaker specification [A]	6	7	15

INFO

Q-MODE is unavailable for QS-V20 in 120 VAC environment.

120V ±10% 50-60Hz Single phase	HEAVY DUTY	PERFORMANCE
Average power consumption - stress test [W]	300	400
Average power consumption - typical game [W]	70	70
Peak power for converter specification [kVA]	1.0	1.2
Average power for converter specification [kVA]	0.5	0.8
Peak current for breaker specification [A]	9	11

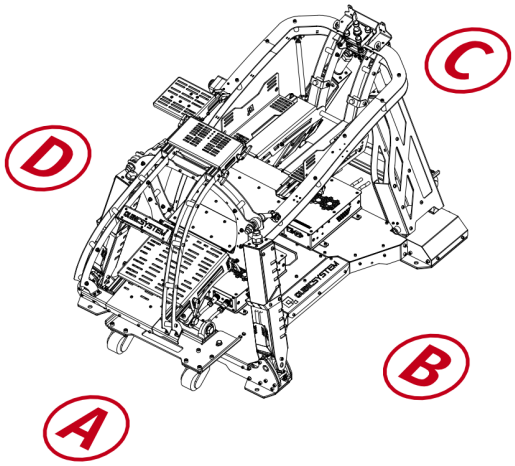
2.7. ENVIRONMENTAL CONDITIONS

The QS-V20 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. NOISE EMISSION

The QS-V20 was checked for noise level based on actual standards. Noise level during normal work condition is **not over 70 dB**. Measuring method is ISO 11202. Four measuring positions as shown on the picture are placed 160 cm from the floor level and 100 cm from the edge of the device.



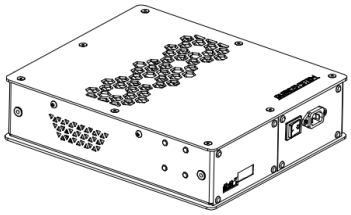
Measurement point	A	B	C	D
Measurement conditions: ■ Sinus input signal ■ Auto acceleration ■ 100% speed ■ Heave 100 mm ■ 0,9 Hz frequency ■ 100 kg ballast load	65,1 dB(A)	65,3 dB(A)	65,5 dB(A)	65,7 dB(A)
■ Typical game ■ 100 kg ballast load	58,3 dB(A)	60,2 dB(A)	58,6 dB(A)	57,5 dB(A)

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, the 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.

Follow the steps below:

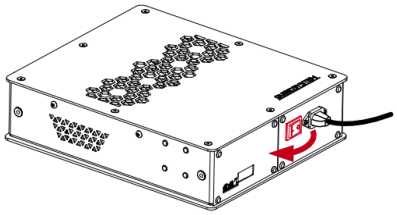
1. Verify that the motion platform is OFF - the power switch on the Power Cabinet is not backlit, and **QubicManager** displays an Offline status.



Platform's power is OFF

QubicManager bottom left corner:

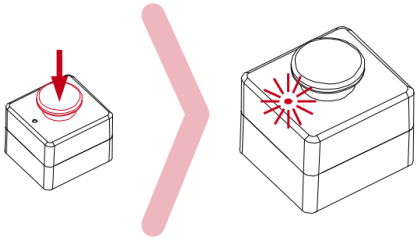
2. Turn the Power ON. The platform will not move.



Platform's power is ON

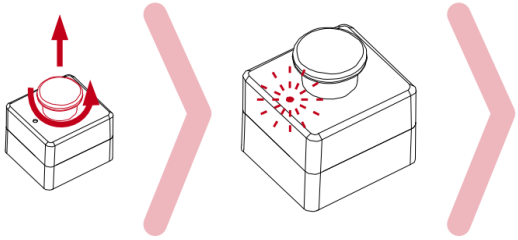
QubicManager bottom left corner:

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



QubicManager bottom left corner:

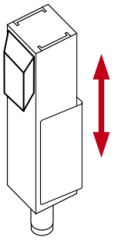
4. Turn the **Motion Lock button** counterclockwise - diode blinks. The system will perform start-up calibration. Do not change the payload.



QubicManager bottom left corner:

Status: Pending Ref-Run (5)

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



Actuators perform the calibration process

QubicManager bottom left corner:

Status: Parked/Centered (5)

or:

Status: Running (5)

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.

3. INSTALLATION

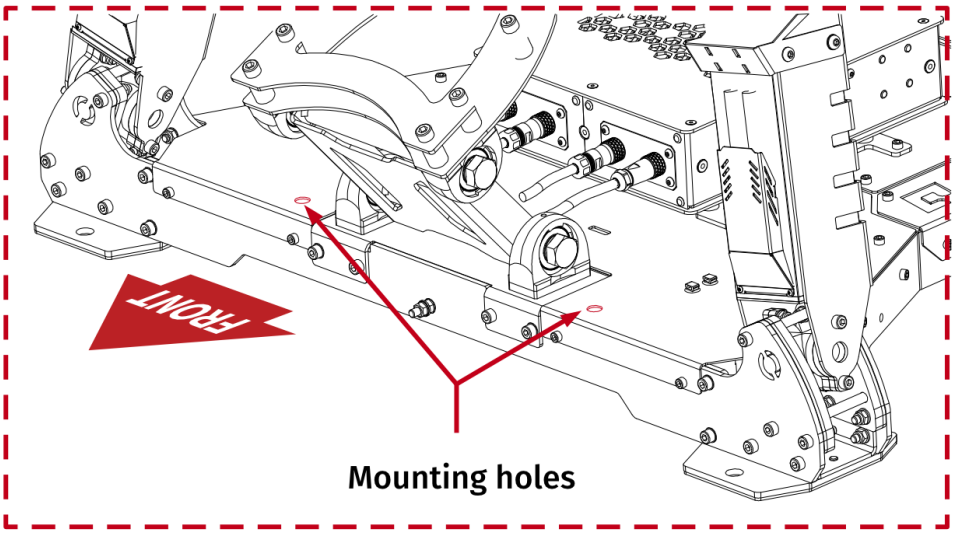
3.1. TRANSPORTATION WHEELS

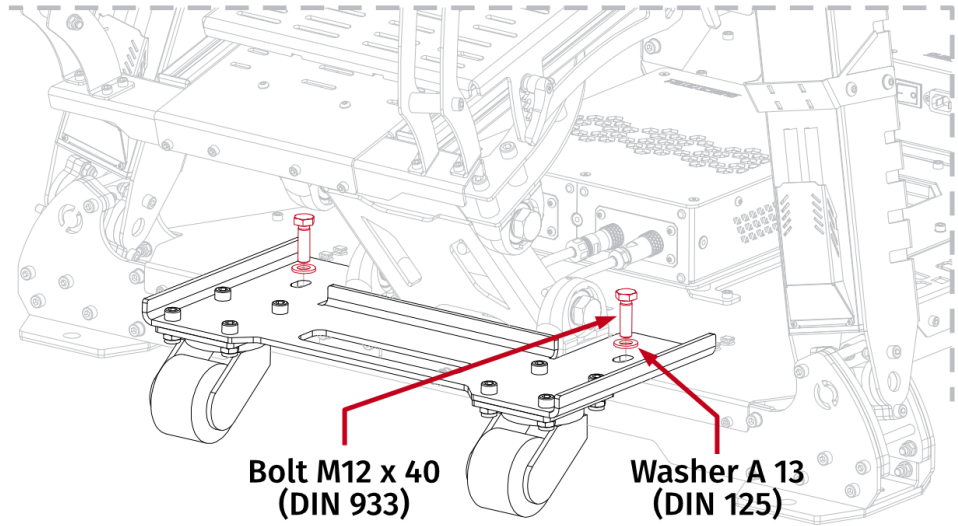
WARNING

Demounting transportation wheels is necessary before starting the simulation. It is forbidden to use the device with transportation wheels attached.

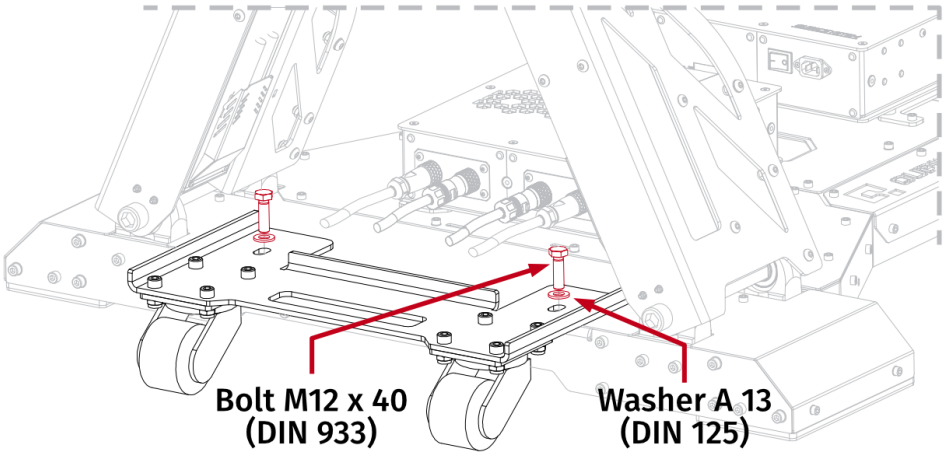
The QS-V20 is shipped with transportation wheel attached on the front and back side to make it easier to place the machine on customer's site. After the QS-V20 has been situated, transportation wheels need to be removed from the device in order to start simulation. Use 19 mm socket wrench to screw in or out the bolts 2x M12 x 40 DIN 933 bolts per side.

Front side transportation wheels:





Rear side transportation wheels:

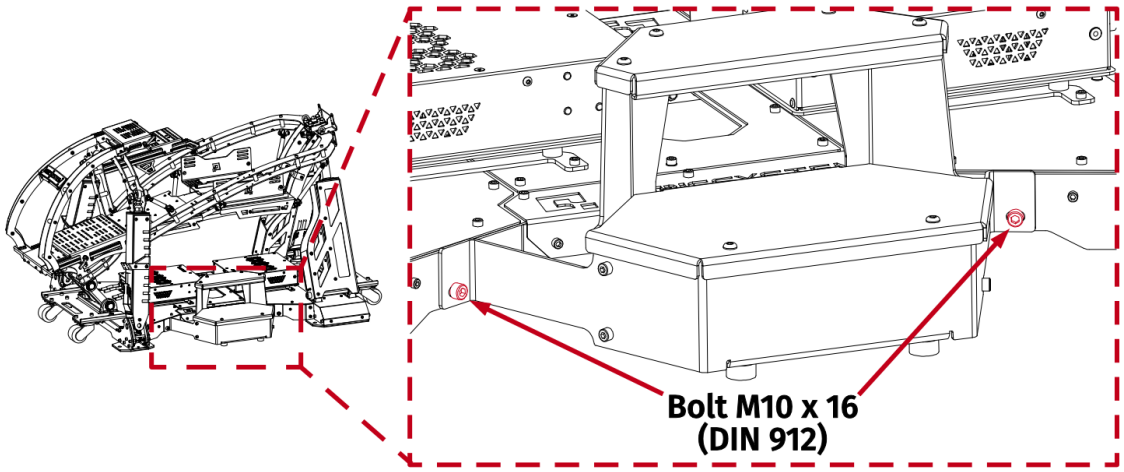


INFO

To avoid damaging the floor it is recommended to always remove the side steps before maneuvering the machine on the wheels. For steps disassembly details go to section **3.2** on page **19**.

3.2. STEPS INSTALLATION

Connect the steps module to the main frame with 2 x DIN 912 - M10 x 16 bolts using 8 mm hex key (max. torque - 45 Nm (33.2 fb-lbs)). Bolts are not included separately - they are screwed in the platform.



INFO

Steps module can be installed on either side of the machine. Mounting holes are available symmetrically on both sides.

3.3. SWITCHING BETWEEN DESK AND DIRECT DRIVE BRACKET

Default steering wheel mount requires bottom mounting. Alternatively a direct drive bracket is provided.

1. Unscrew adjustable handles counterclockwise.
2. Remove the steering wheel mount and install direct drive bracket.
3. Screw in the same adjustable handles to lock the bracket in place. Use them to adjust the direct drive bracket placement.

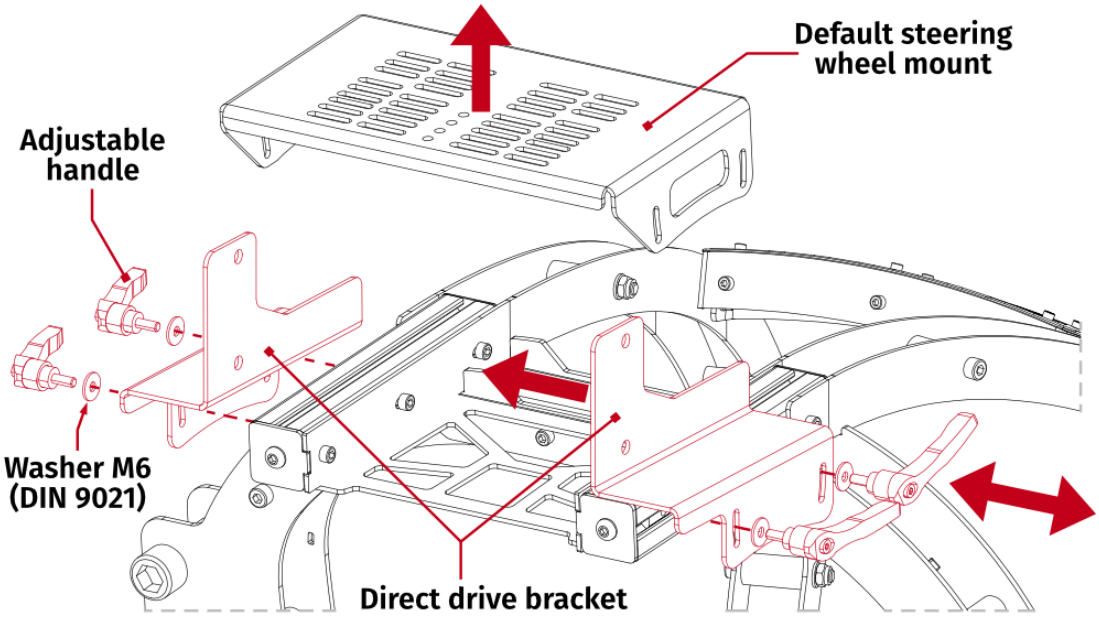
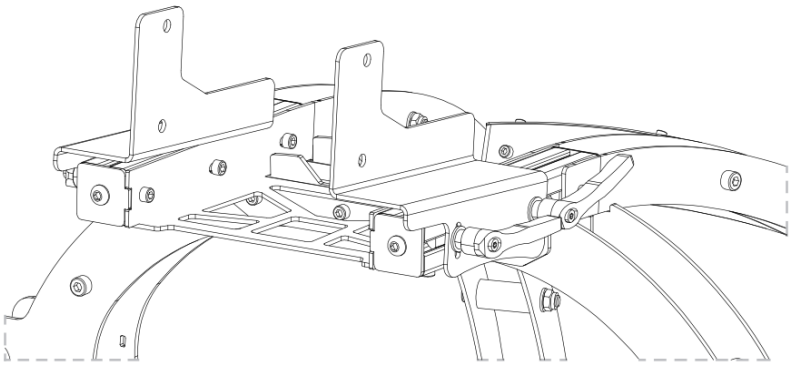
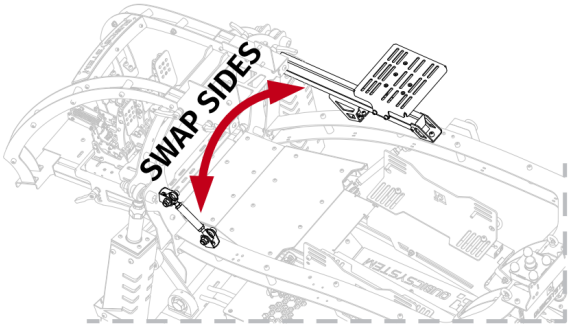


Illustration of a completed assembly:

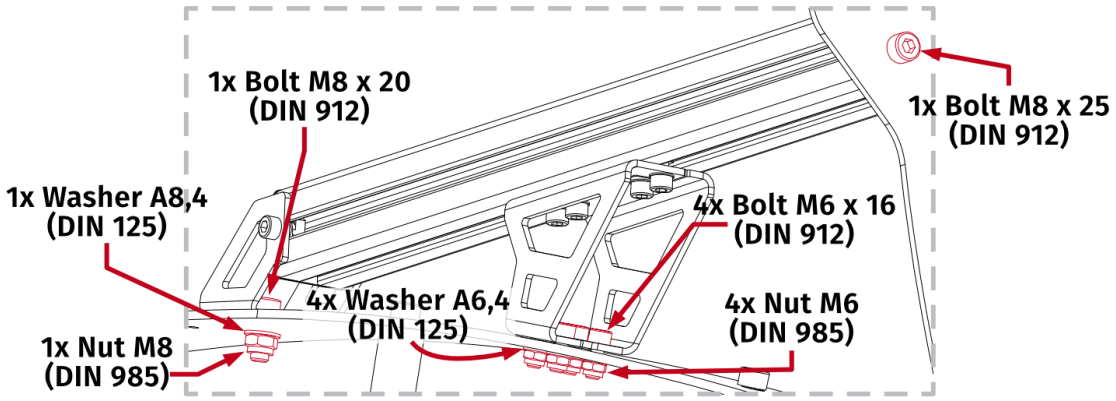


3.4. LEFT SIDE SHIFTER HOLDER PLACEMENT

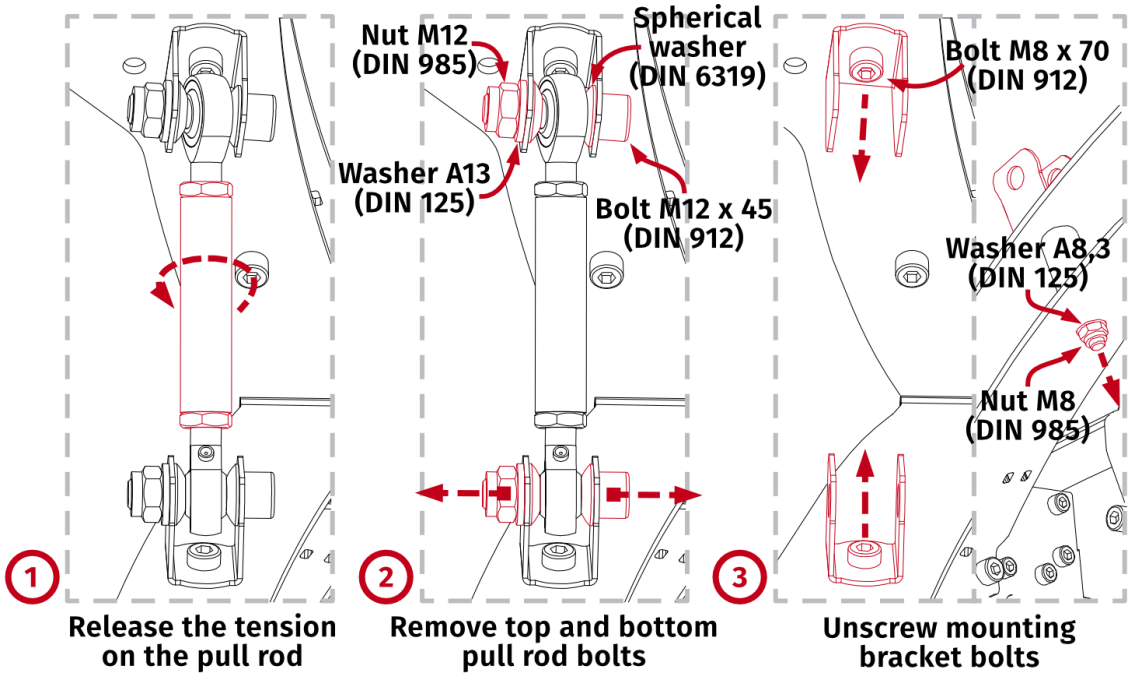


Factory assembly contains shifter/handbrake holder on the right side. QS-V20 is designed to convert for right hand drive vehicle simulation by swapping the shifter/handbrake holder with the pulling rod.

1. Unscrew 6 bolts holding the shifter holder in place and remove it :



2. Release the tension from the pull rod by rotating it counterclockwise until it is loose.
3. Unscrew top and bottom pull rod mounting bolt and remove the pull rod.
4. Unscrew and remove the pull rod mounting brackets.



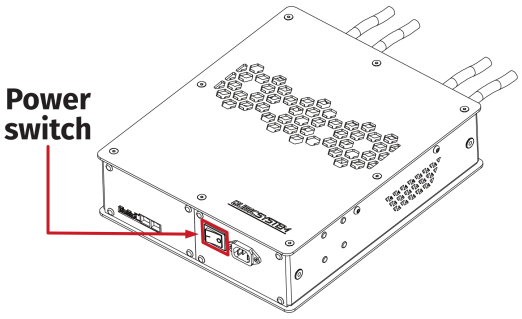
Swap the pull rod with the shifter holder. The mounting holes are symmetrical on both sides. Assembly is the reverse of disassembly:

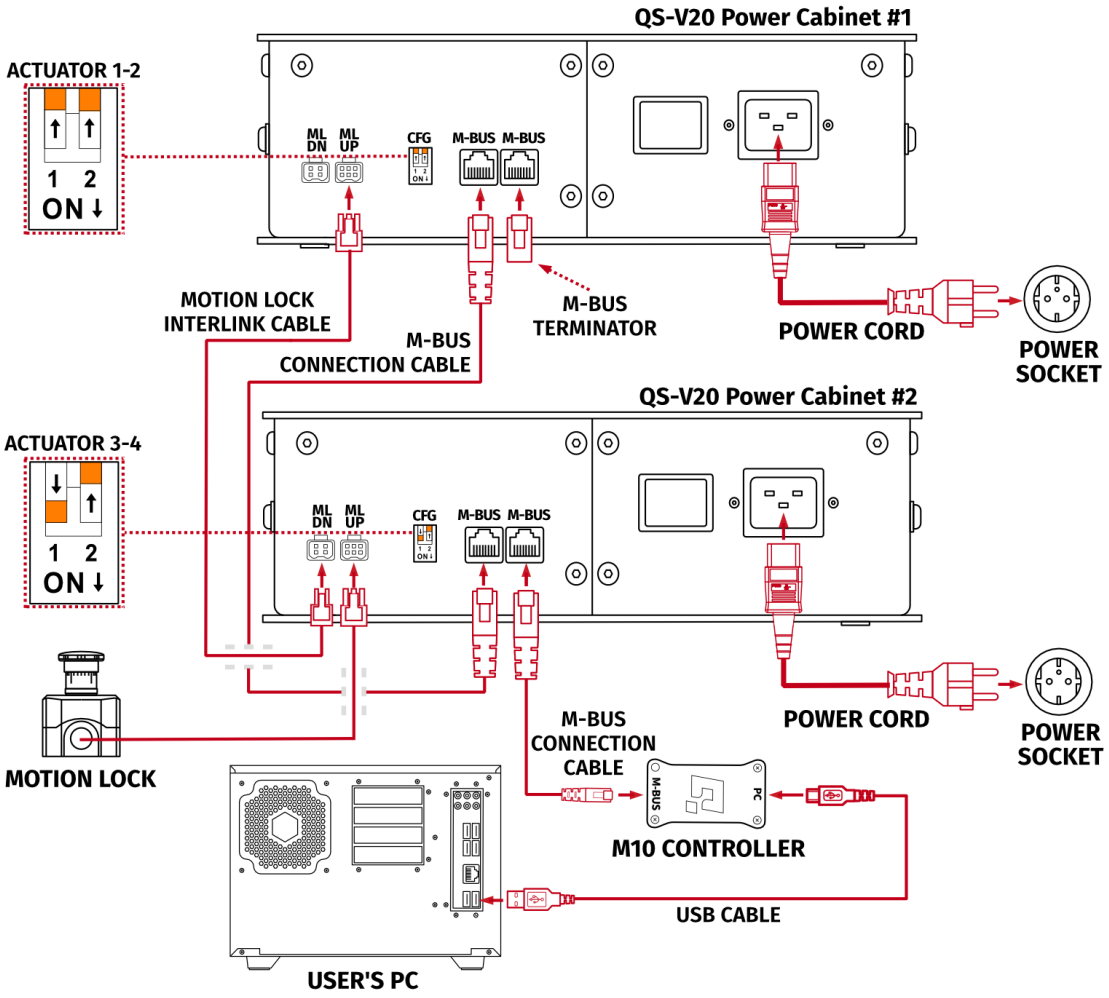
1. Bolt in the shifter holder with all 6 bolts (max. torque for M6 DIN 912 bolts - 9.5 Nm (7 fb-lbs); max. torque for M8 DIN 912 bolt - 23 Nm (17 fb-lbs))
2. Bolt in the pull rod mounting brackets (max. torque for M8 DIN 912 bolt - 23 Nm (17 fb-lbs)).
3. Bolt in both pull rod ends using all of provided hardware. **DO NOT** overtighten the bolts.
4. Turn the pull rod clockwise until it is firmly tightened.

3.5. INTERCONNECTIONS

WARNING

- QS-V20's default factory setting of the CFG switches is correct and ready for operation. The diagram is provided for informational purposes only.
- Motion Lock button and interconnection cables are connected from factory. User must only connect his PC with the machine via M10 controller and power it up by plugging the power cords (as instructed in the diagram) and switch the power rocker switches ON.





INFO

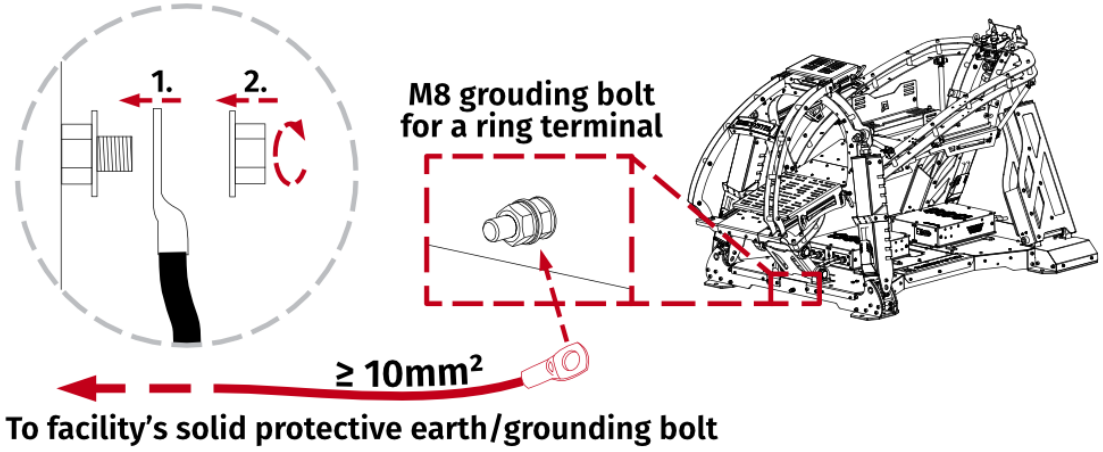
Order of connecting the cables is not important, keep the CFG switches setting according to the interconnections scheme.

WARNING

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.

3.6. CONNECTING GROUNDING WIRES

Ensure that before first power up, the grounding wire is connected from facility's solid protective earth/ground to the machine, using a dedicated grounding bolt at the front of the QS-V20.



3.7. ACTUATOR CONNECTION WITH A POWER CABINET

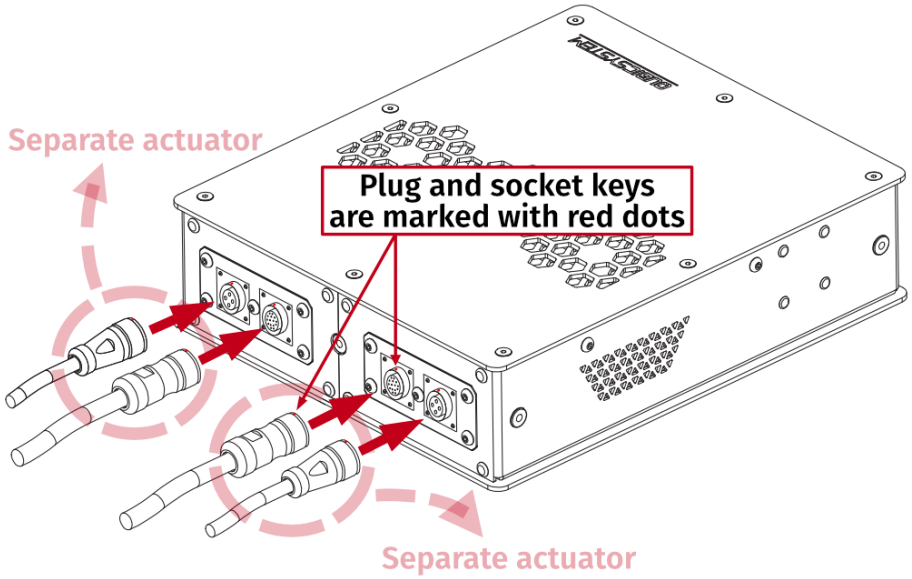
INFO

Revised version of the QS-V20 is equipped with push-pull actuator connectors. If your machine has integrated actuator cables, this section does not apply.

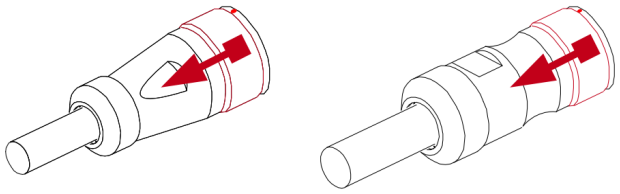
WARNING

- QS-V20's actuators are connected with Power Cabinets from factory and **DO NOT** require any attention from user during initial start-up procedure.
- Plugging and unplugging the actuator must **ALWAYS** be performed with Power Cabinet's power switched OFF.

To connect the actuator to a Power Cabinet - match the plug with the socket (4 vs. 15 pin) and plug it in, matching the key at the top of the plug (also marked with a red dot). Push it in **firmly** until the PUSH-PULL ring lock **clicks in place**.

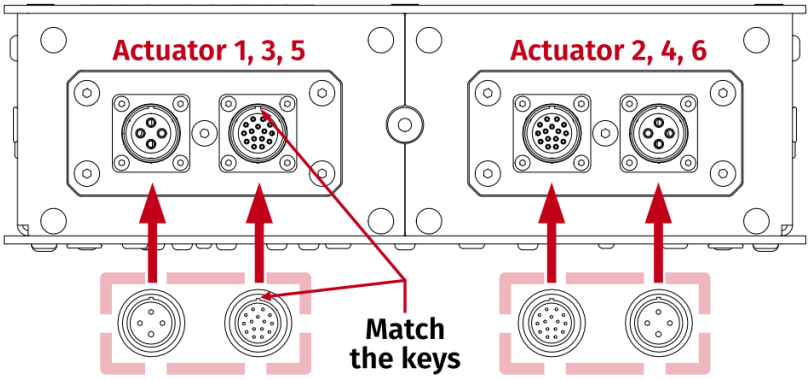


To disconnect the plug, first pull on the metal ring to release the lock and then pull the plug to disconnect:



NEVER pull the plug by the cable

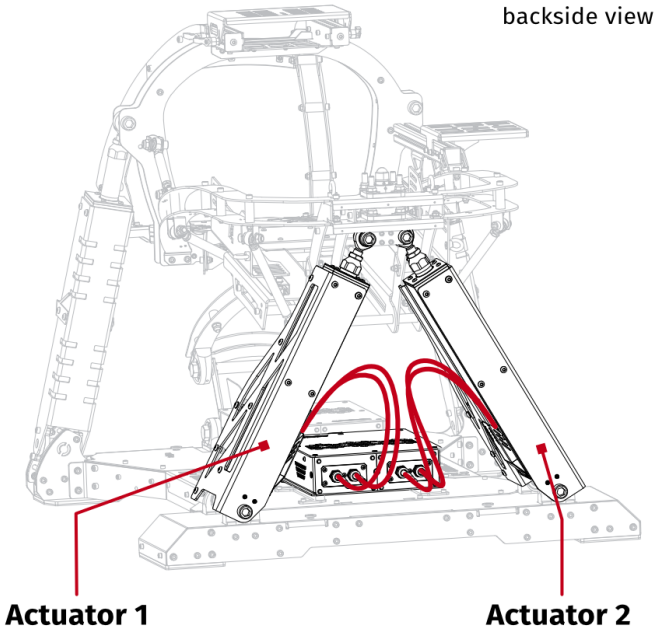
Keep in mind the order of connecting the actuators. Left socket panel is for odd number actuator, and right socket panel is for even number actuators.

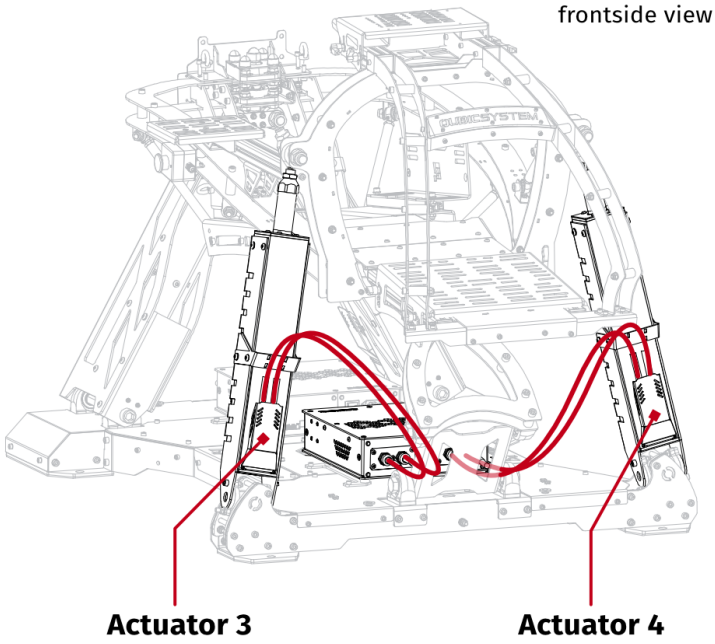


WARNING

Under no circumstances **DO NOT** plug QS-210 actuator to QS-220 Power Cabinet and QS-220 actuator to QS-210 Power Cabinet. That **WILL** lead to an irreversible damage to the actuators and will **NOT** be covered by a warranty.

Keep in mind that for the correct operation of the device, pair of actuator cables must be plugged to the correct pair of sockets. Left actuator must be plugged into the left socket panel (Actuator 1 or 3) and right actuator must be plugged into right socket panel (Actuator 2 or 4). Refer to the illustration below:



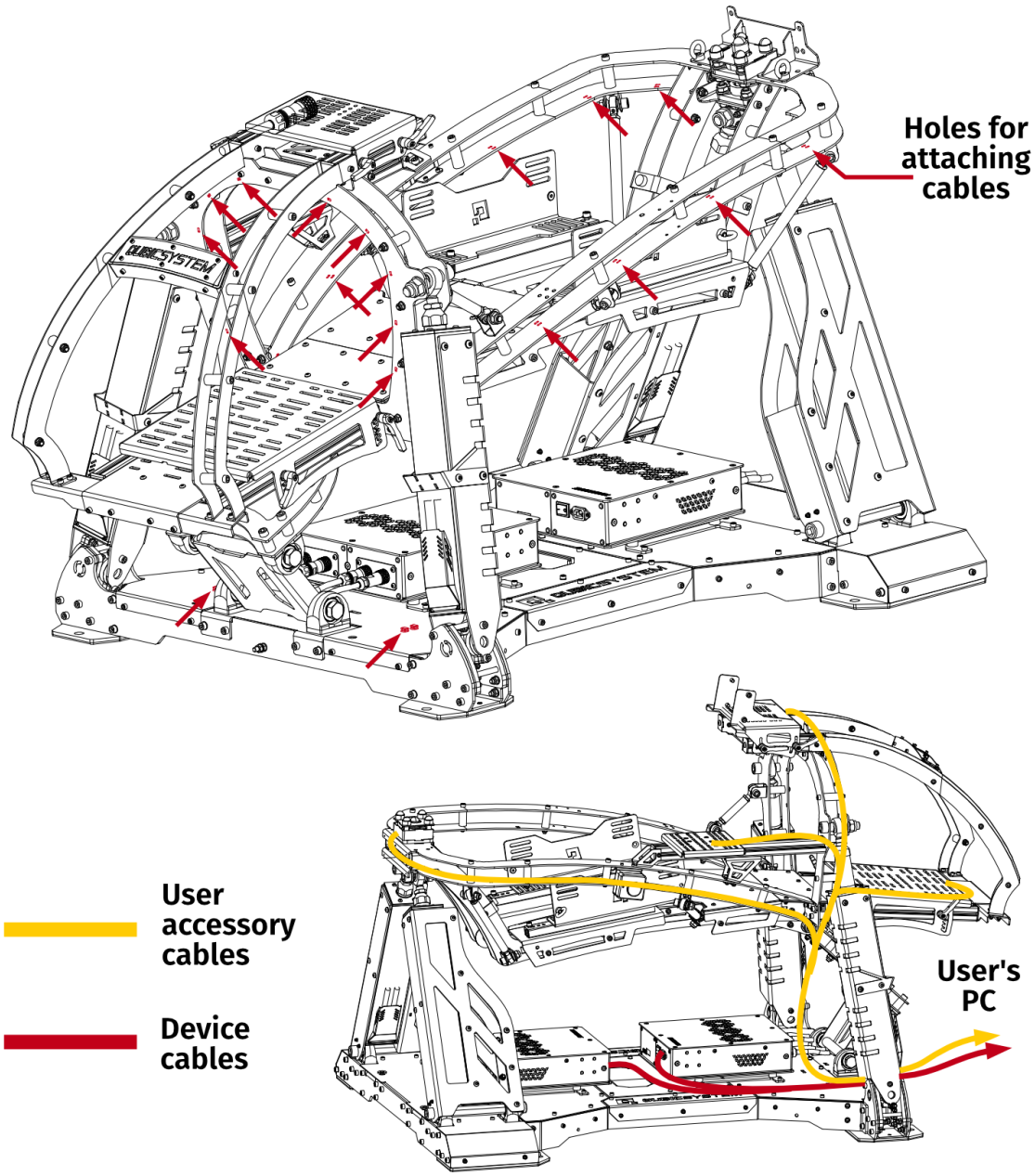


WARNING

NEVER unplug the actuator with Power Cabinet's power ON, because the actuator will **launch upwards abruptly**.

3.8. CABLE MANAGEMENT

All cables should be routed in way that prevents them from being stretched, crashed or damaged by the actuators and cockpit in motion. Cables from the accessory components that are in motion with the platform must be routed along the frame of the cockpit (using cable holders or cable ties) and released at the front, near the PC.

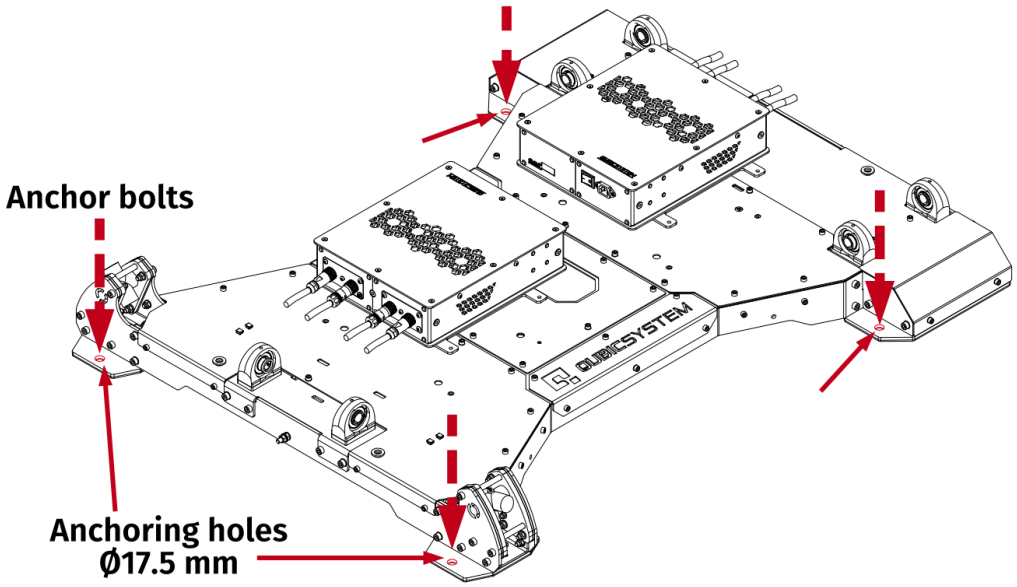


3.9. MACHINE ANCHORING

Depending on the floor surface, the platform may crawl in all directions during normal operation. It is recommended to anchor it to the ground.

INFO

Anchor bolts are not included.

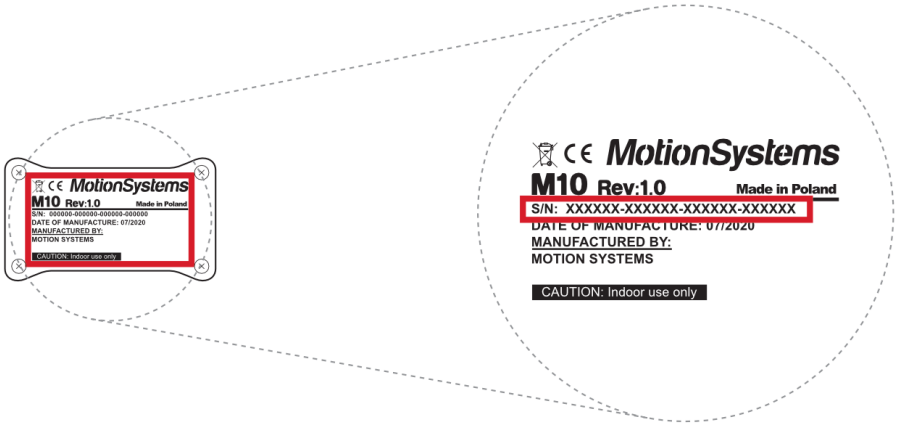


INFO

- It is recommended to use M16 wedge anchor bolts (x4).
- Wedge anchor bolts must be specifically matched for the type of bottom surface that the machine will be installed on. If you are not sure what type of anchoring hardware should be used - contact a construction expert/structural engineer.

3.10. SOFTWARE INSTALLATION

The **SERIAL NUMBER** can be found on the M10 identification label in the **XXXXXX-XXXXXX-XXXXX-XXXXXX** format. This serial number is also used for activation of FSMI (Force-SeatMI) and MT (Motion Theater) licences - check information in section **3.10** on page **33**.



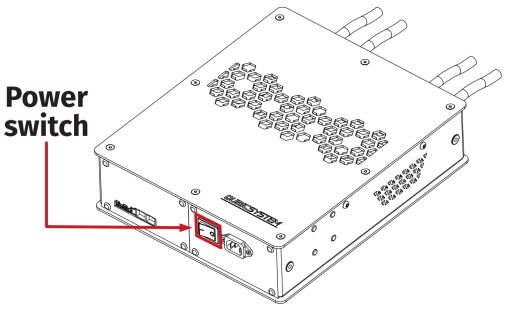
Software installation procedure:

1. Connect the devices according to the interconnections scheme - see section 3.5
2. Download QubicManager from **QubicSystem.com/Download**
3. Enter the serial number located on the identification label.

INFO

Alternatively, you can download a small application that will read the code directly from your device (if it is connected via USB): **Download link**

4. Proceed with the installation steps and launch the application.
5. Turn on the device by switching on both power switches Power cabinets

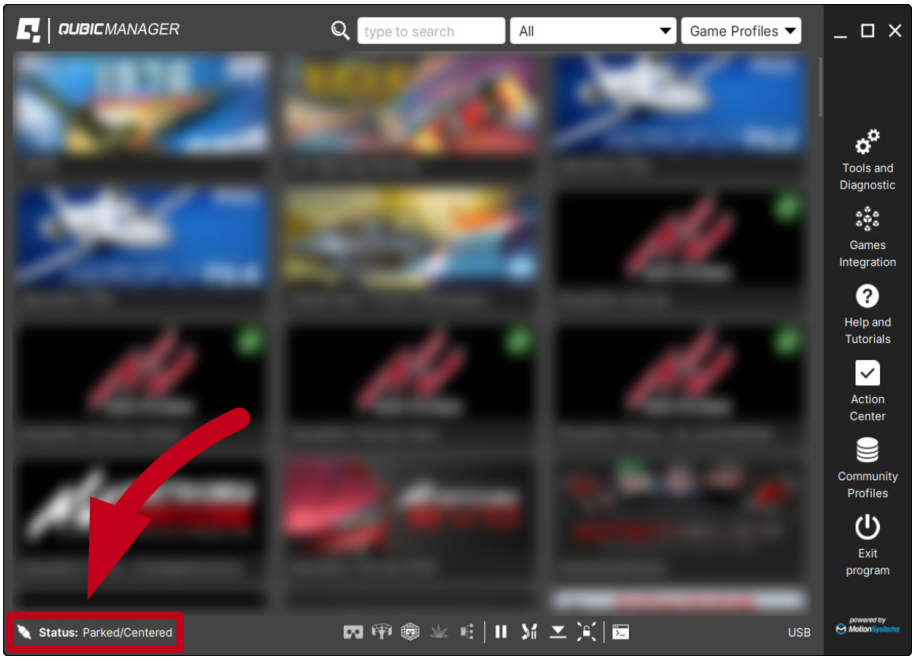


6. Cycle through the Motion Lock Switch positions - press and unpress it (go to section **2.9** on page **16** for details on the procedure).
7. The QS-V20 will perform a start-up calibration.

WARNING

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

8. If QubicManager has recognized the QS-V20 correctly, the status of the machine visible in the lower left corner will change to **Parked/Centered**.

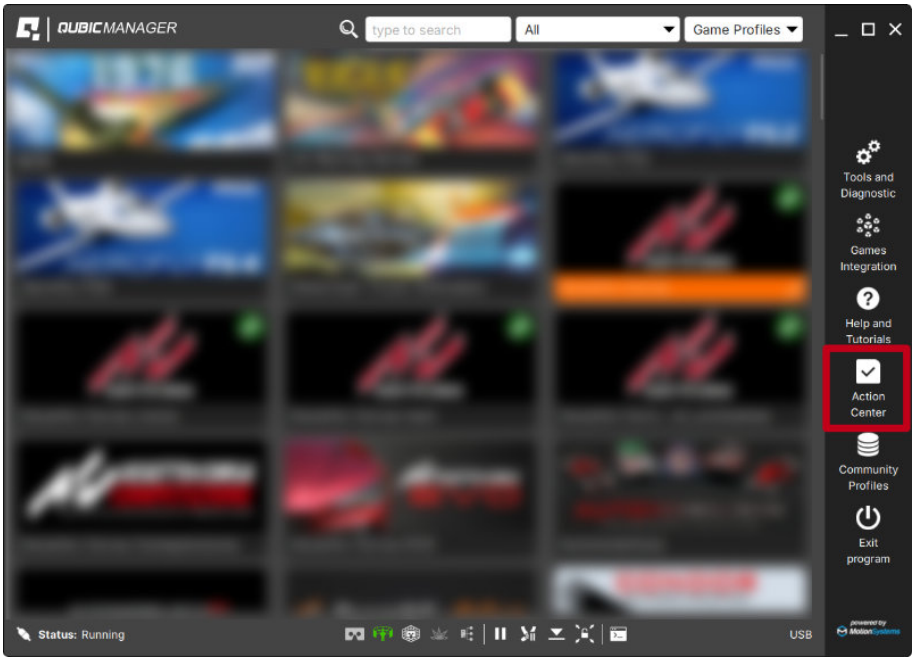


WARNING

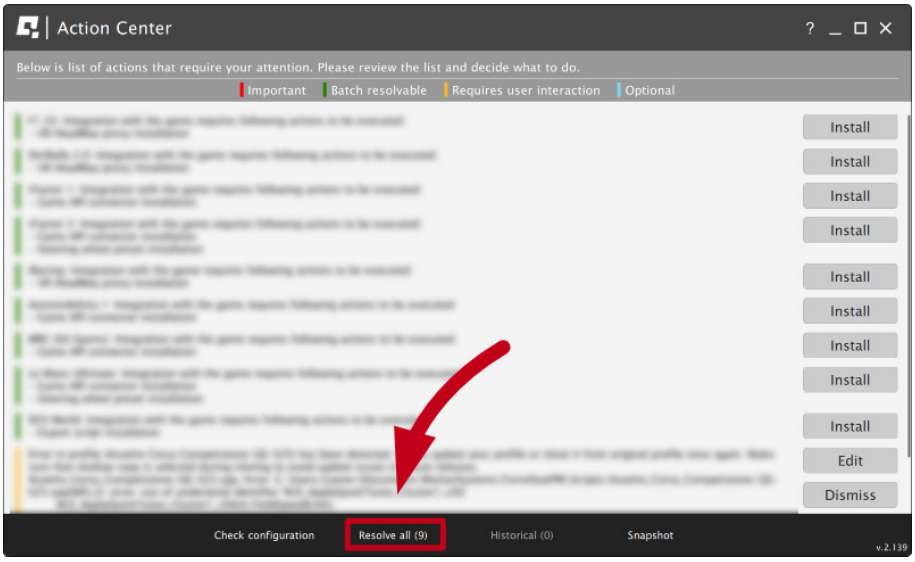
If the device did not connect correctly:

- 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 **37**.

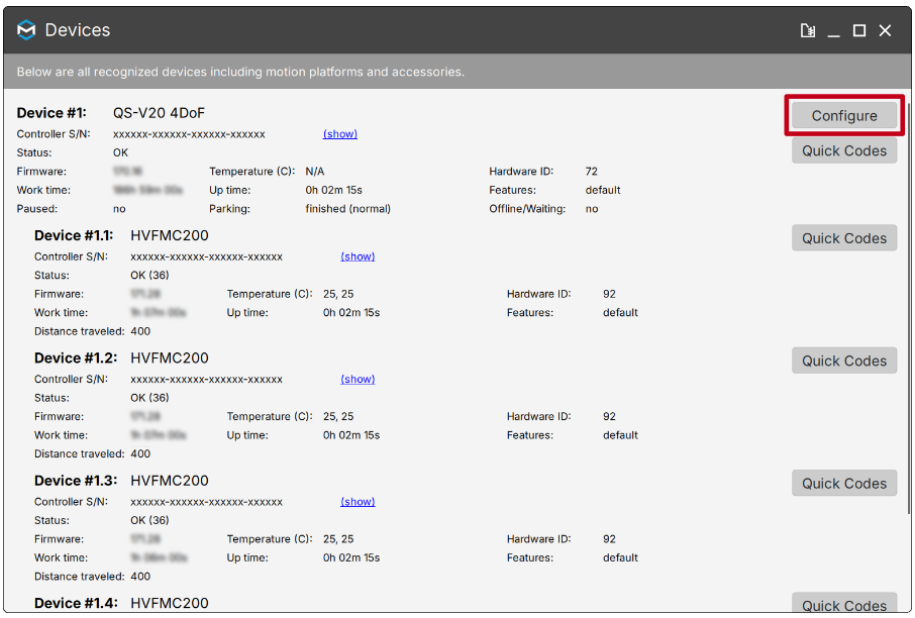
9. Check **Action Center** on the right side panel for a list of actions that requires attention:



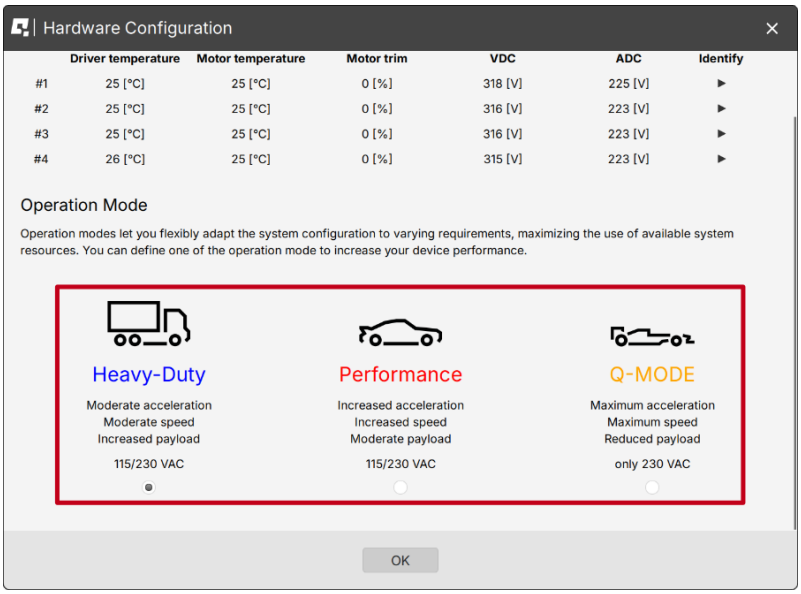
It is possible to solve them one by one or by pressing the **Resolve All** button. Firmware update may require additional confirmation in the dialogue box.



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



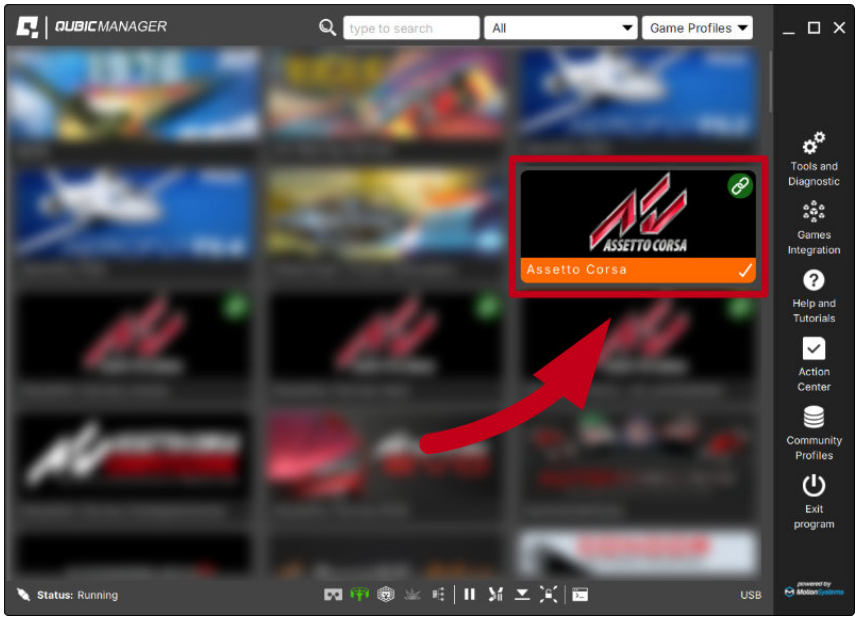
11. Choose one of operation modes (by default it's Heavy-duty setting)



INFO

Q-MODE is unavailable for 120V power supply.

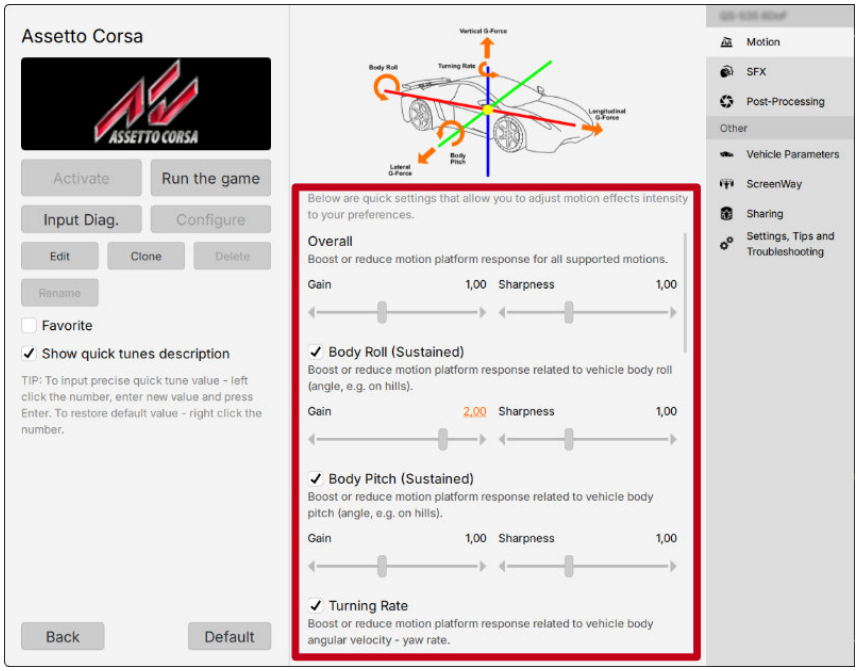
12. Close the configuration and return to the main application window. Choose the game and check profile details by clicking on the game tile.



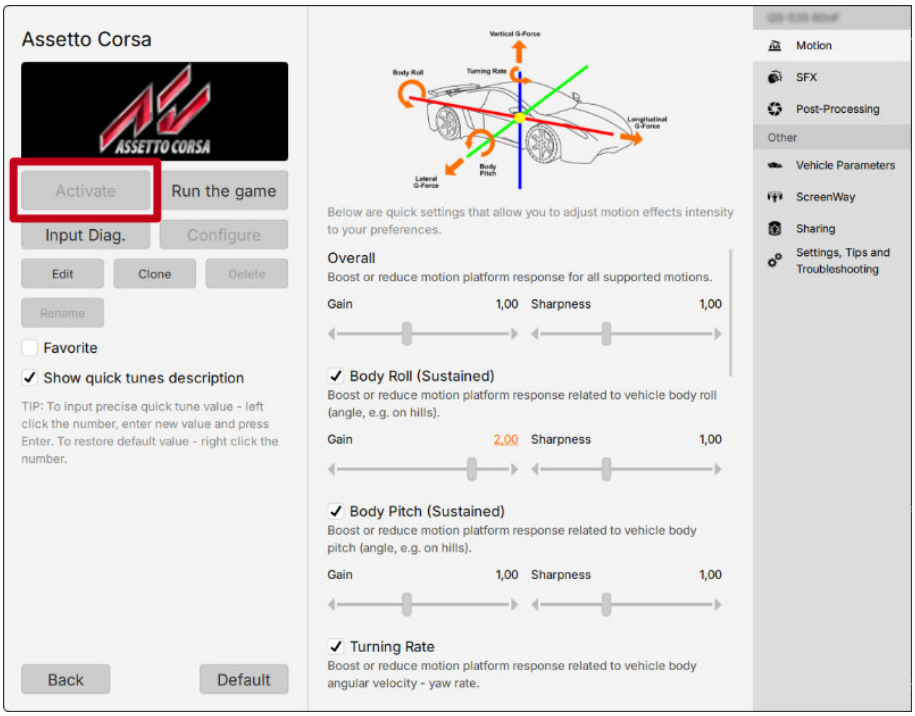
INFO

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

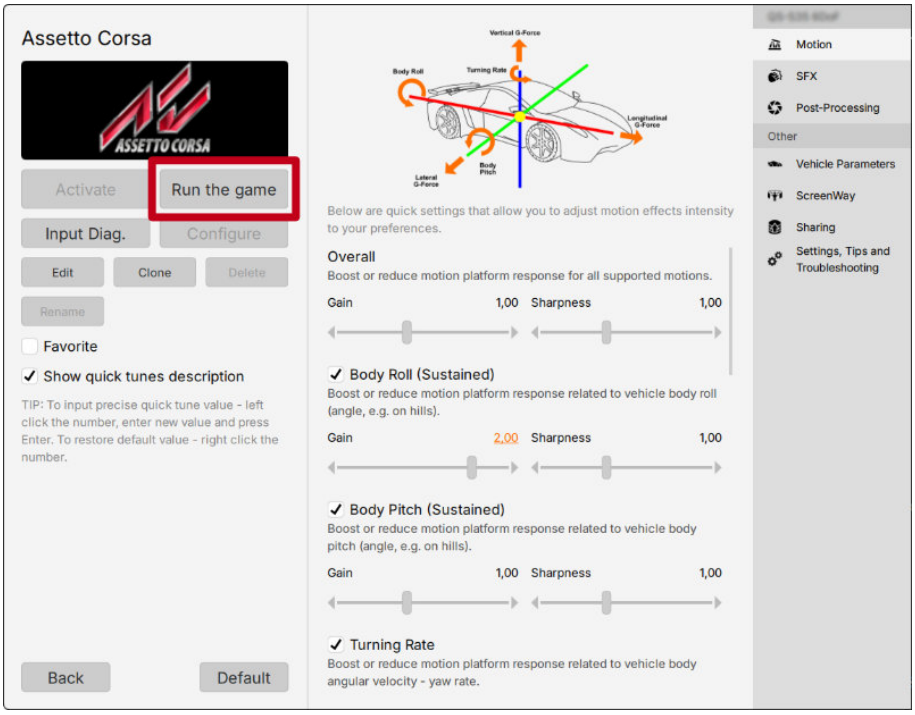
13. Adjust the motion effects intensity up to your preferences in the game profile window. Scroll down to see all of the settings.



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



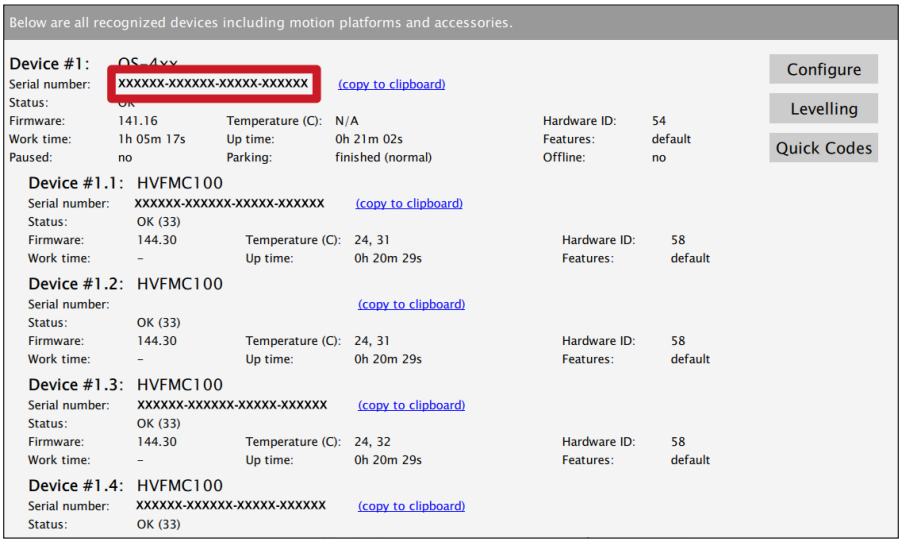
15. Launch the game by clicking the **Run the game** button.



16. 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-V20 go to **Tools and Diagnostics → Devices**. Serial number is visible under the device name:



WARNING

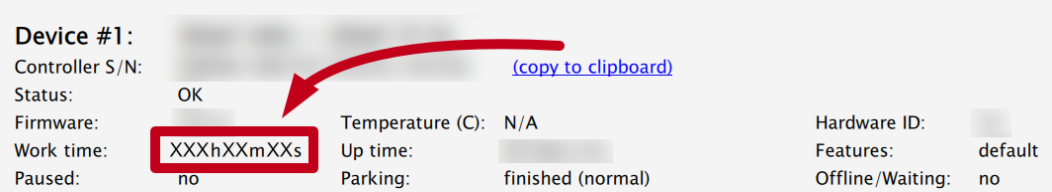
The software is provided "as is", without warranty of any kind, express or implied, including but not limited to the warranties of merchantability, fitness for a particular purpose, and non-infringement. In no event will the authors or copyright holders be liable for any claim, damage, or other liability, 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-V20 device listing:



To minimize the risk of abnormal heating that can result in system failure, keep the QS-V20 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-V20 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:

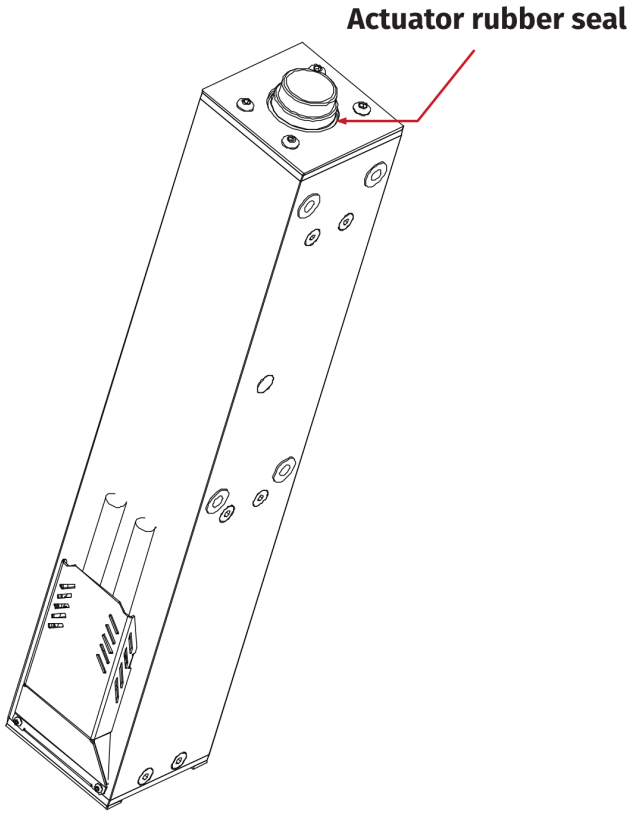
1. Before anyone steps into the platform - turn on the QS-V20.
2. Push the red Motion Lock button.
3. The machine should stop and not react to any signal.
4. Turn on a simulation or a game to confirm that - with a correct profile activated proceed to a game or a simulation and engage movement.

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

X 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. ACTUATOR RUBBER SEAL

To minimize the risk of QS-V20 failure, check the condition of the linear actuator's rubber seals once a month, and lubricate them externally, if necessary, using a viscous lubricant spray with dispenser.



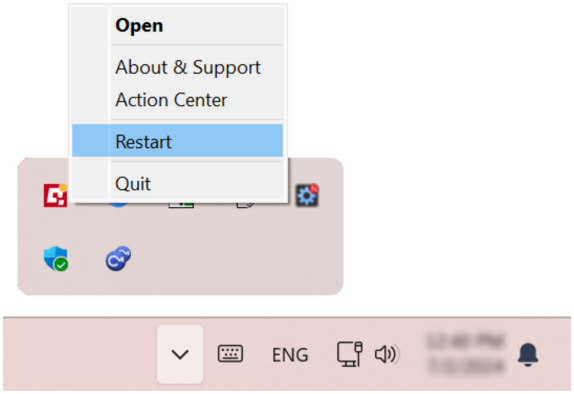
5. TROUBLESHOOTING

WARNING

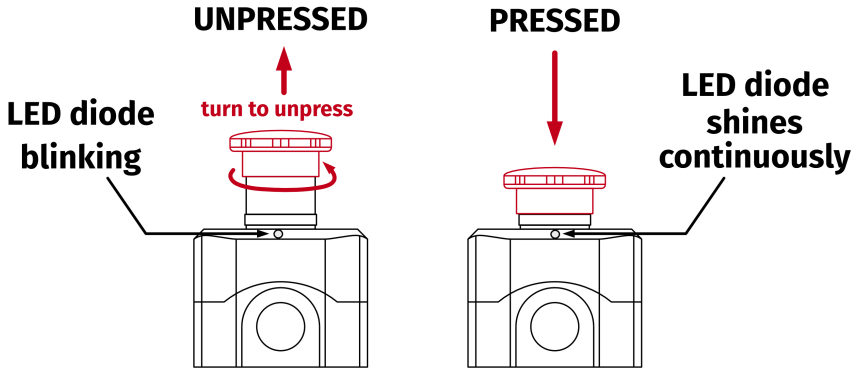
DO NOT attempt to do any repairs by yourself. It could be dangerous and will result in loss of warranty! Repairs should be consulted with technical support and then performed by a qualified technician.

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) :



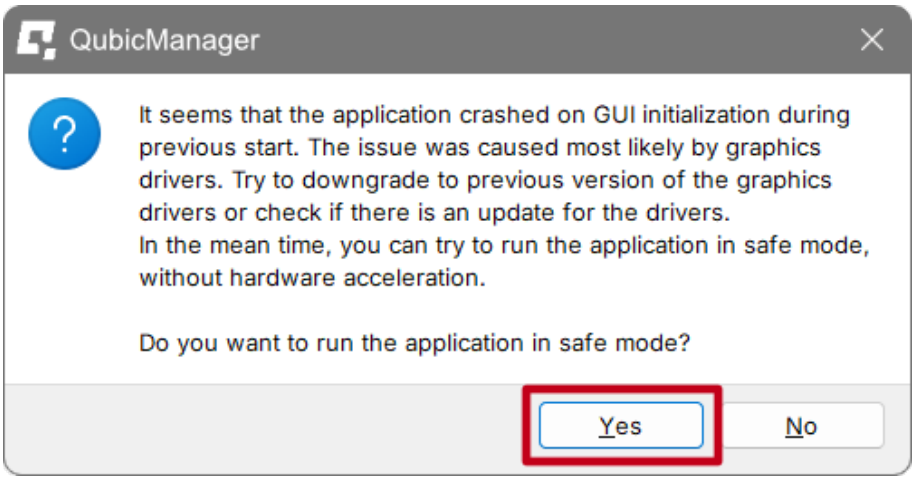
- Try different USB ports (also try bypassing the USB hub by a direct PC connection).
- If a problem occurred abruptly, it could be caused by a thermal protection. Turn off the QS-V20, disconnect it from power outlets and wait at least 15 minutes to let it cool down. Try turning it on again later.
- In case of any unclear electrical issues, strange behavior or abnormal work conditions, contact technical support.

5.1. COMMON PROBLEMS WITH SOLUTIONS

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

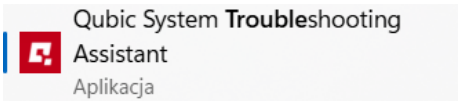
  Solution long-term #1: This issue is caused by graphics drivers. Try to downgrade to a previous version of graphics drivers or check for updates.

  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.

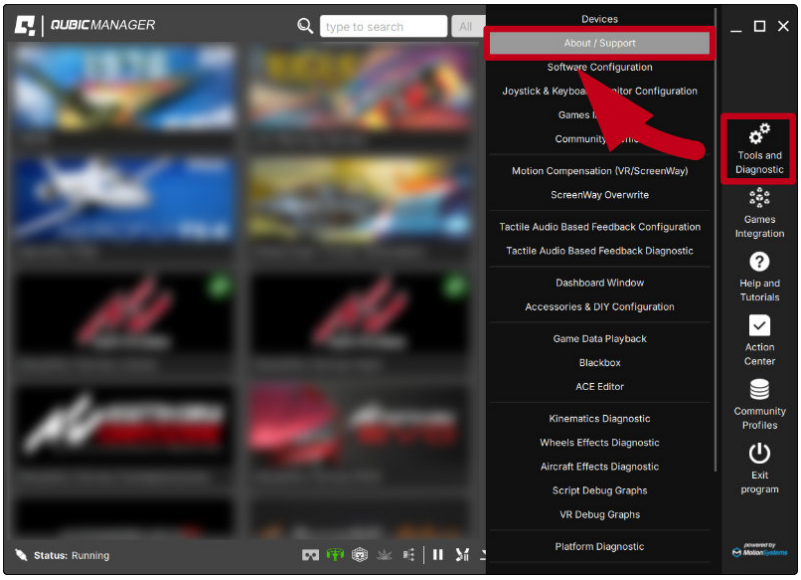
5.2. CREATING A SNAPSHOT

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.

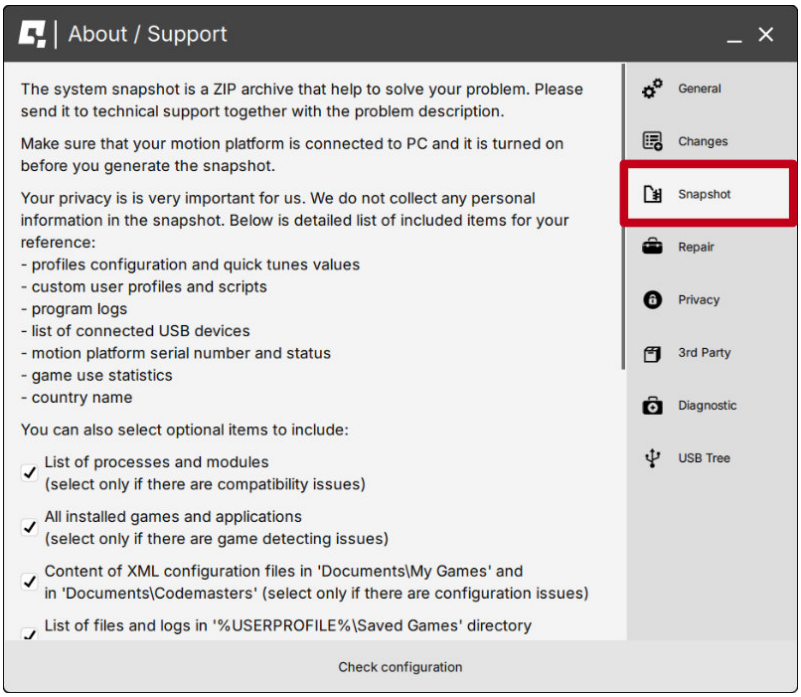
INFO

The QS-V20 and all interconnected Power Cabinets **MUST BE** be powered up when creating the snapshot.

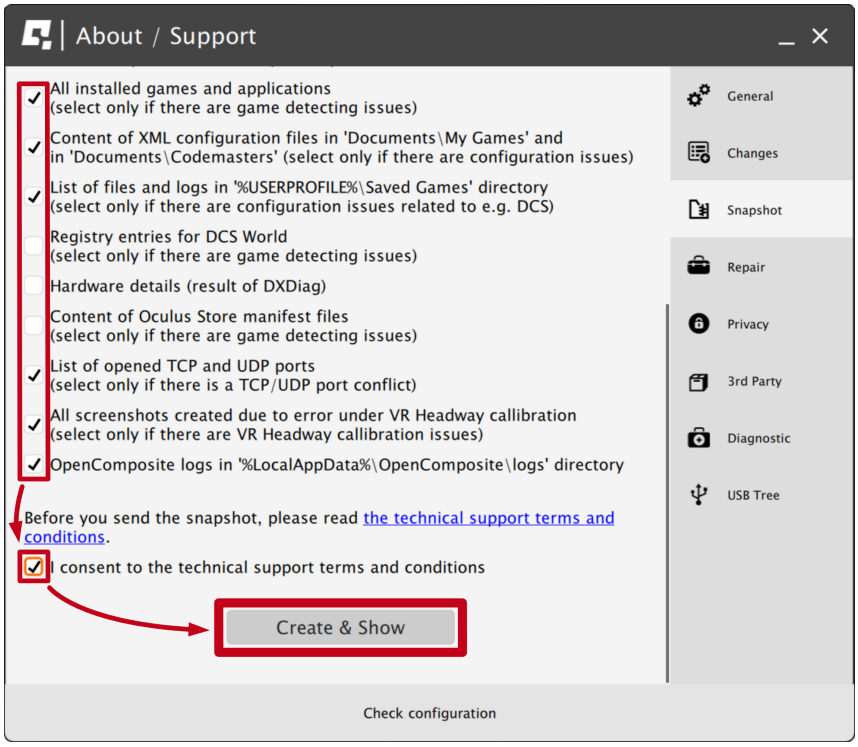
1. Open the main window of the QubicManager application.
2. Go to **Tools and Diagnostic** → **About / Support**.



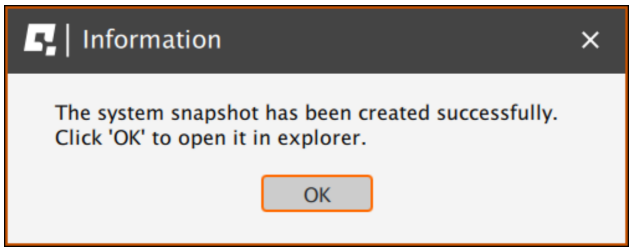
3. Open the **Snapshot** window:



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**:

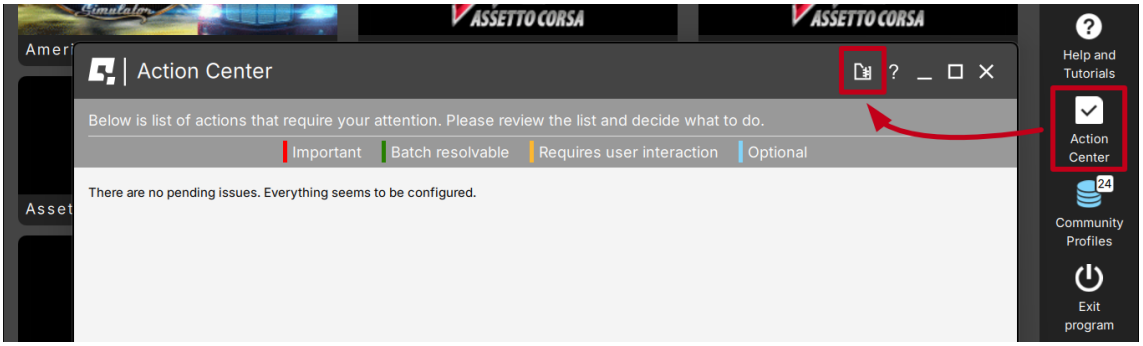


6. The snapshot has been created, click the **OK** button - the folder with the snapshot ZIP file will open.



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

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



5.3. 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

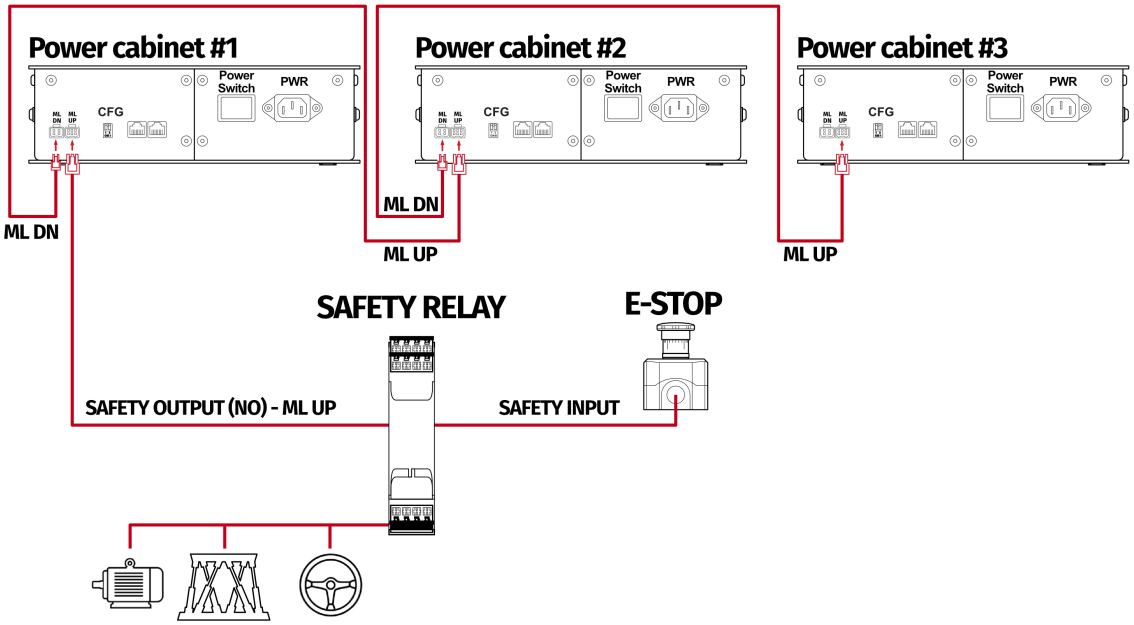
When applying safety relay to the Motion Lock :

- 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 mm^2
- 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).

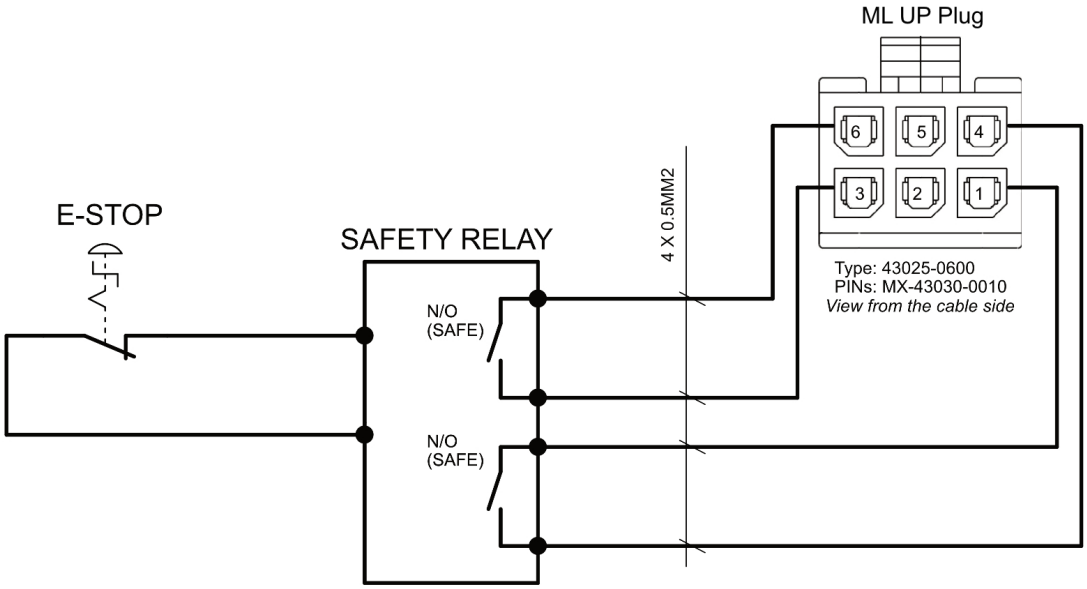
6.1. ADDING ADDITIONAL DEVICES TO THE MOTION LOCK CIRCUIT

If there is necessity to stop other devices, apart from the QS-V20, 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:



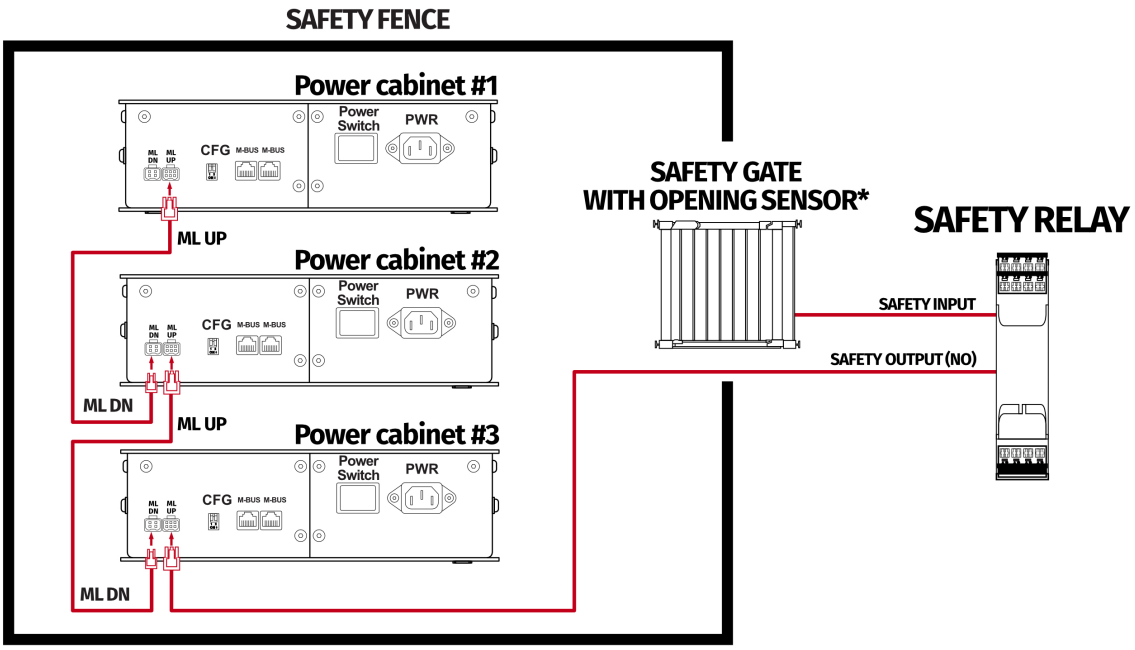
Example wiring diagram of application of one-channel safety relay with E-STOP button:



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

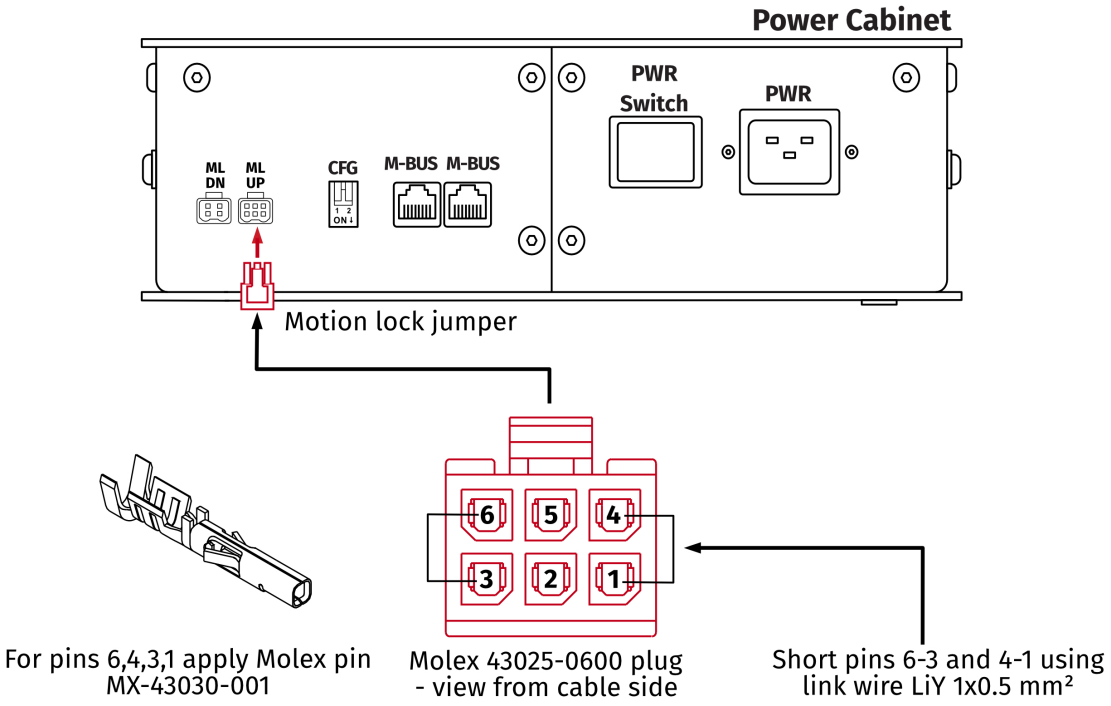
6.3. INCREASING SAFETY LEVEL

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:



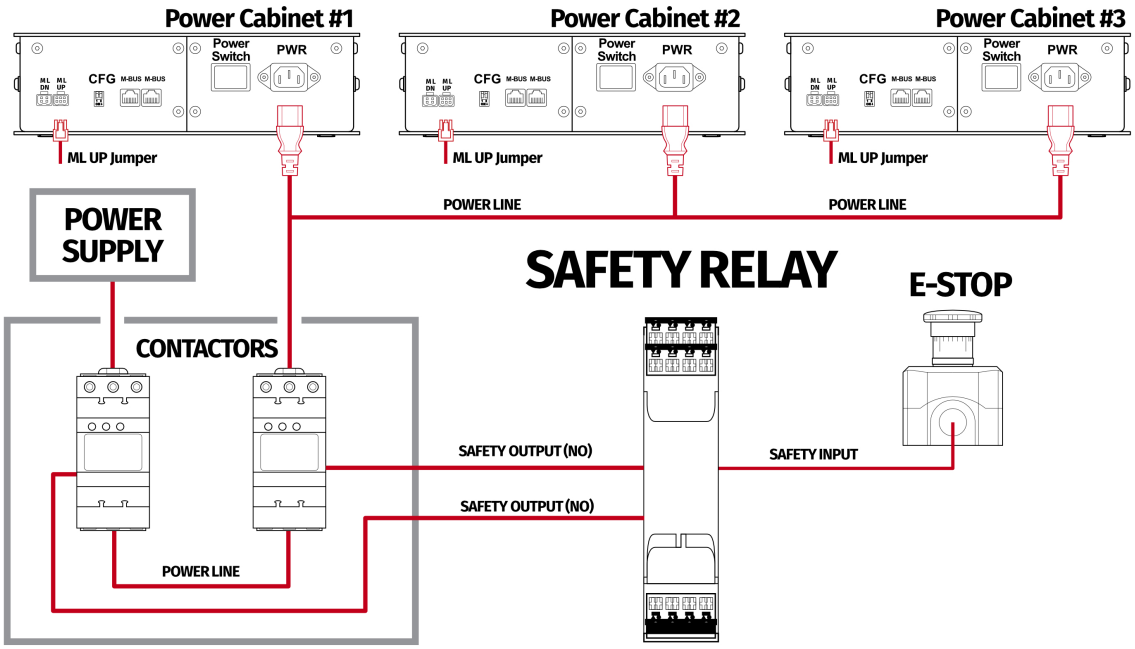
6.3.2 ADDING POWER-CUT CIRCUIT WITH E-STOP BUTTON

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.

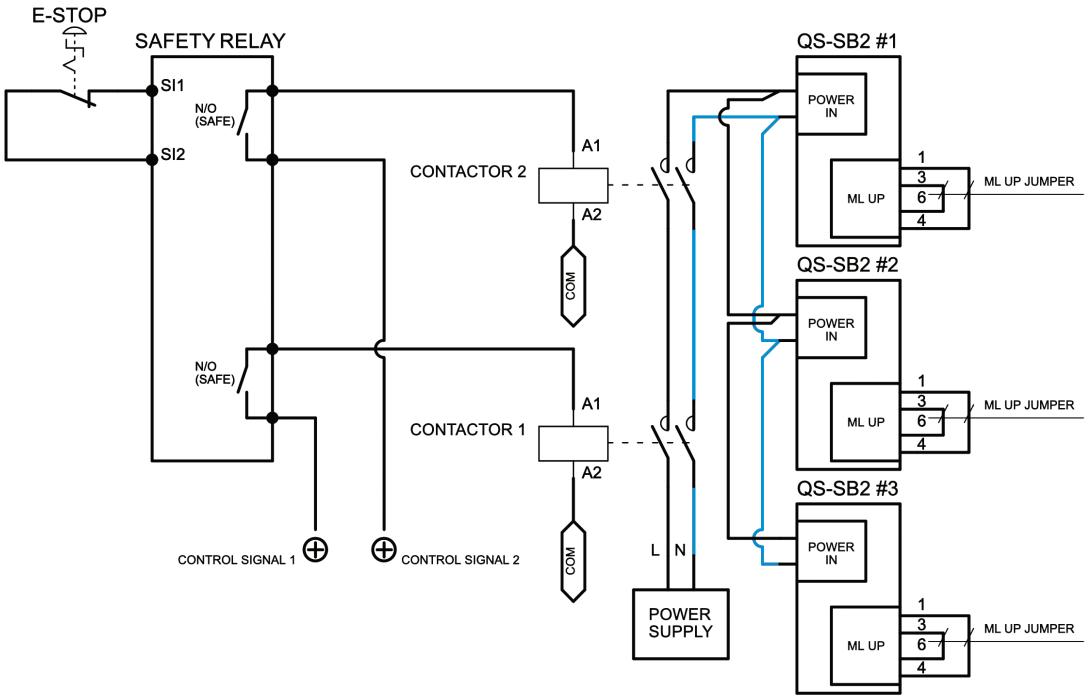
Example application of power line contactors and E-STOP button:



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:



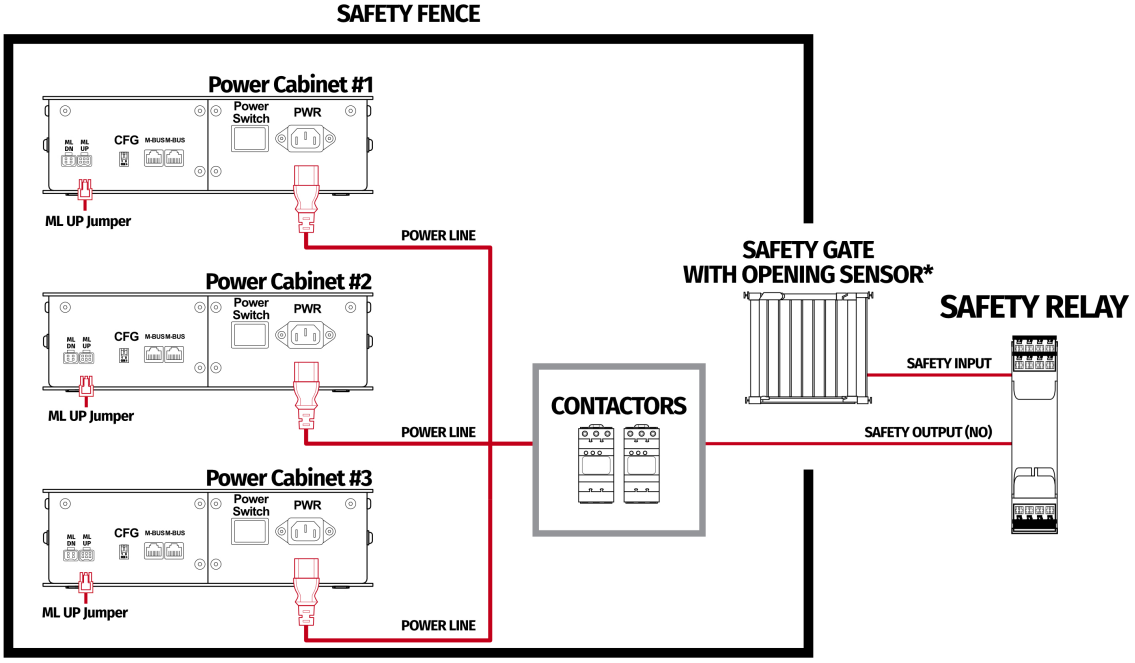
INFO

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

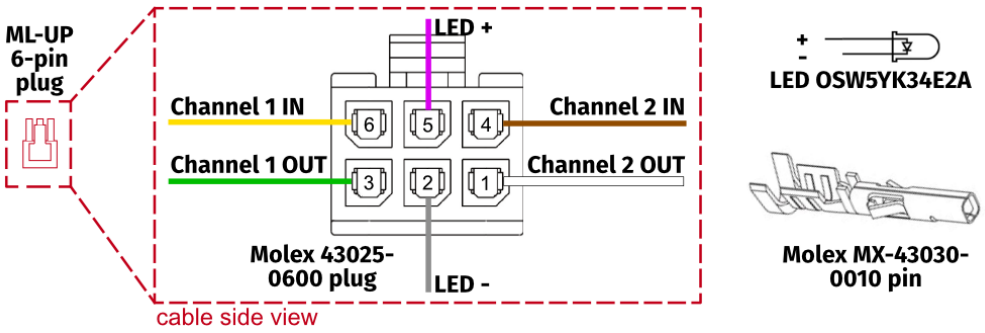
INFO

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

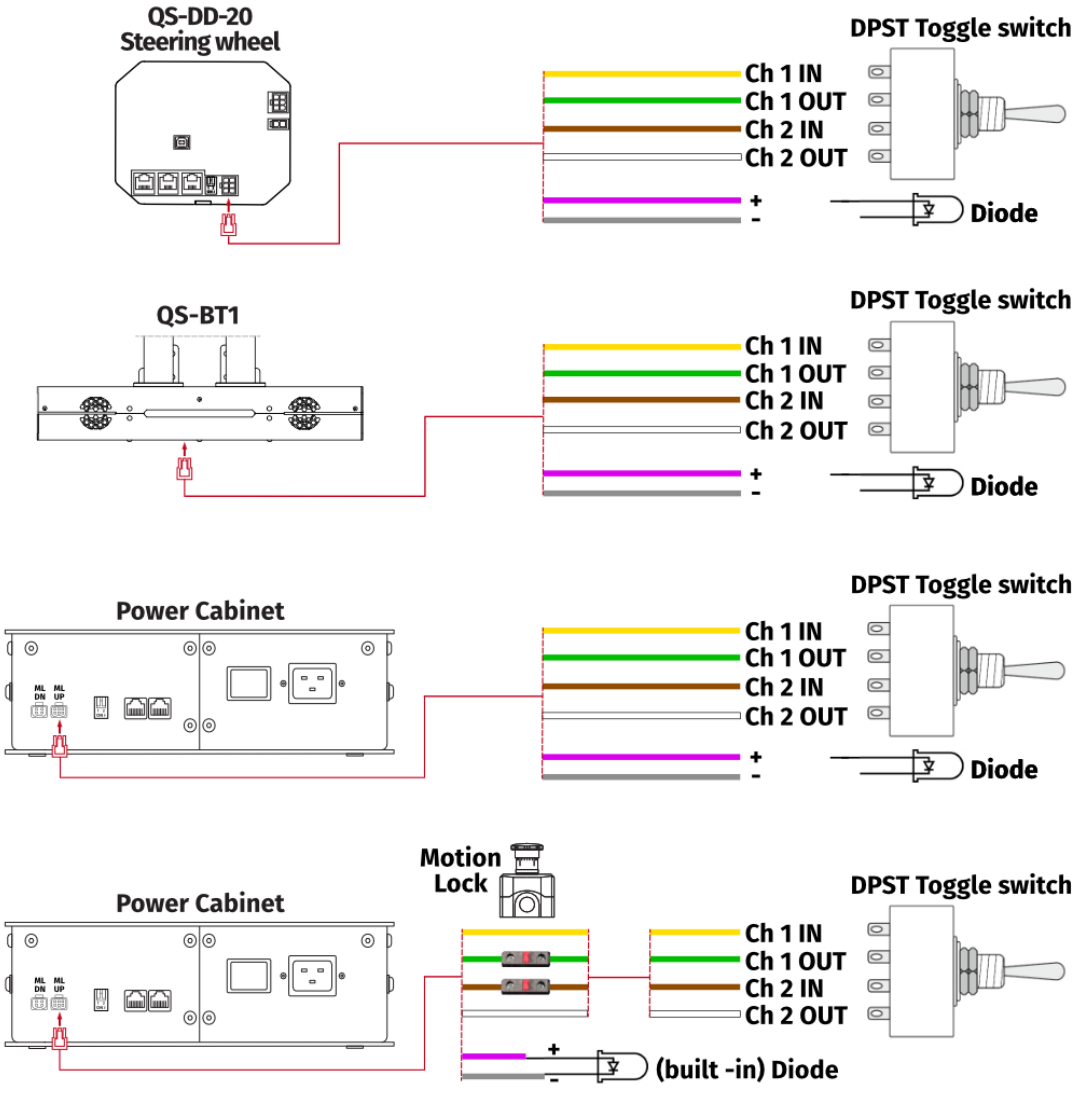
- Use control cables according to your safety relay manual
- Power line cables shall be chosen accordingly to power requirements of motion system. See power requirements of specific motion system.

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-V20 meets the requirements of CE and relevant regulations of the EMC Directive 2014/30/EU.

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-V20 is shipped with wooden cases/cardboard boxes. If the packaging is no longer needed, it can be fully recycled.

QS-V20 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-V20 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-V20 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

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.

QUBICSYSTEM

QS V20