



ESX QUANTUM QM400.1 Class D Mono Amplifier Owner's Manual

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OWNER'S MANUAL
VERS.1.2
QM400.1
CLASS D MONO AMPLIFIER

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SPECIFICATIONS

MODEL	QM400.1
CHANNELS CIRCUIT	1 CLASS D Digital
OUTPUT POWER RMS 13,8 V Watts @ 4 Ohms Watts @ 2 Ohms	1 x 250 1 x 450
OUTPUT POWER MAX. 13,8 V Watts @ 4 Ohms Watts @ 2 Ohms	1 x 500 1 x 900
Frequency Range –3dB Damping Factor Signal-to-Noise Ratio THD&N Input Sensitivity	16 – 5000 Hz > 100 dB > 98 dB < 0,05% 5 – 0,2 V
Various Subsonic Filter Various Lowpass Filter Various Bass Boost Various Phase Shift	10 – 40 Hz 50 – 5000 Hz 0 – 18 dB @ 40 Hz 0 – 180°
Start-stop capability High Level Inputs with EPS Auto Turn On Bass Remote Fullrange Outputs (RCA)	7,5 V via DC or Signal yes yes stereo
Fuse Ratings	50 A (external)
Dimensions Width x Height x Length	190 x 35 x 112 mm

Technical specifications are subject to change! Errors are reserved!

SAFETY INSTRUCTIONS

PLEASE NOTE THE FOLLOWING ADVICE BEFORE THE FIRST OPERATION!

THE PURCHASED DEVICE IS ONLY SUITABLE FOR AN OPERATION WITH A 12V ONBOARD ELECTRICAL SYSTEM OF A VEHICLE. Otherwise fire hazards, risk of injury, and electric shock consist.

PLEASE DO NOT MAKE ANY OPERATION OF THE SOUND SYSTEM, WHICH DISTRACT YOU FROM A SAFE DRIVING. Do not make any procedures, which demand longer attention. Perform these operations not until you have stopped the vehicle in a safe place. Otherwise, the risk of accident consists.

ADJUST THE SOUND VOLUME TO AN APPROPRIATE LEVEL, SO THAT YOU ARE STILL ABLE TO HEAR EXTERIOR NOISES WHILE DRIVING.

High-performance sound systems in vehicles may generate the acoustic pressure of a live concert. The permanent listening to extremely loud music may cause the loss of your hearing abilities. The hearing of extremely loud music while driving may derogate your cognition of warning signals in the traffic. In the interests of common safety, we suggest driving with a lower sound volume. Otherwise, the risk of accident consists.

DO NOT COVER COOLING VENTS AND HEAT SINKS. Otherwise, this may cause heat accumulation in the device and fire hazards consists.

DO NOT OPEN THE DEVICE. Otherwise, fire hazards, risk of injury, and electric shock consist. Also, this may cause a loss of the warranty.

REPLACE FUSES ONLY WITH FUSES WITH THE SAME RATING. Otherwise, fire hazards and risk of electric

shock consist.

DO NOT USE THE DEVICE ANY LONGER, IF A MALFUNCTION, WHICH REMAINS UNREMEDIED. Refer in this case to the chapter TROUBLESHOOTING. Otherwise risk of injury and the damage of the device consists. Commit the device to an authorized retailer.

THE INSTALLATION OF A POWER CAPACITOR WITH SUFFICIENT CAPACITY IS RECOMMENDED. High-performance amplifiers cause high potential voltage drops and need a high power consumption at a high volume level. To relieve the vehicle's- board system, it is recommended to install a power capacitor between the battery and the device which works as a buffer. Consult your car audio retailer for the appropriate capacity.

INTERCONNECTION AND INSTALLATION SHOULD BE ACCOMPLISHED BY SKILLED STAFF ONLY. The interconnection and installation of this device demand technical aptitude and experience. For your own safety, commit the interconnection and installation to your car audio retailer, where you have purchased the device.

DISCONNECT THE GROUND CONNECTION FROM THE VEHICLE'S BATTERY BEFORE INSTALLATION . Before you start with the installation of the sound system, disconnect by any means the ground supply wire from the battery, to avoid any risk of electric shock and short circuits.

CHOOSE AN APPROPRIATE LOCATION FOR THE INSTALLATION OF THE DEVICE. Look for an appropriate location for the device, which ensures sufficient air circulation. The best places are spare wheel cavities and open spaces in the trunk area. Less suitable are storage spaces behind the side coverings or under the car seats.

DO NOT INSTALL THE DEVICE AT LOCATIONS, WHERE IT WILL BE EXPOSED TO HIGH HUMIDITY AND DUST. Install the device at a location, where it will be protected from high humidity and dust. If humidity and dust attain inside the device, malfunctions may be caused.

MOUNT THE DEVICE AND OTHER COMPONENTS OF THE SOUND SYSTEM SUFFICIENTLY. Otherwise, the device and components may get loose and act as dangerous objects, which could cause serious harm and damage in the passenger room.

ENSURE NOT TO DAMAGE COMPONENTS, WIRES, AND CABLES OF THE VEHICLE WHEN YOU DRILL THE MOUNTING HOLES. If you drill the mounting holes for the installation into the vehicle's chassis, ensure by any means, not to damage, block, or tangent the fuel pipe, the gas tank, other wires or electrical cables.

ENSURE CORRECT CONNECTION OF ALL TERMINALS. Faulty connections may cause fire hazards and lead to damage of the device.

DO NOT INSTALL AUDIO CABLES AND POWER SUPPLY WIRES TOGETHER. Ensure while installation not to lead the audio cables between the head unit and the amplifier together with the power supply wires on the same side of the vehicle. The best is an areal separated installation in the left and right cable channel of the vehicle. Therewith an overlap of interferences on the audio signal will be avoided. This stands also for the equipped bass remote wire, which should be installed not together with the power supply wires, but rather with the audio signal cables.

ENSURE THAT CABLES MAY NOT BE CAUGHT UP IN CLOSE-BY OBJECTS. Install all the wires and cables as described on the following pages, therewith these may not hinder the driver. Cables and wires which are installed close by the steering wheel, gear lever, or the brake pedal, may be caught up and cause highly dangerous situations.

DO NOT SPLICE ELECTRICAL WIRES. The electrical wires should not be bared, to provide power supply to other devices. Otherwise, the load capacity of the wire may get overloaded. Use therefore an appropriate distribution block. Otherwise, fire hazards and risk of electric shock consist.

DO NOT USE BOLTS AND SCREW NUTS OF THE BRAKE SYSTEM AS A GROUND POINT. Never use for the installation or the ground point bolts and screw-nuts of the brake system, steering system, or other security-relevant components. Otherwise, fire hazards consist or the driving safety will be derogated.

ENSURE NOT TO BEND OR SQUEEZE CABLES AND WIRES WITH SHARP OBJECTS. Do not install cables and wires not close-by movable objects like the seat rail that may be bent or harmed by sharp and barbed edges. If you lead a wire or cable through the hole in a metal sheet, protect the insulation with a rubber grommet.

KEEP AWAY SMALL PARTS AND JACKS FROM CHILDREN. If objects like these will be swallowed, the risk of serious injuries consists. Consult promptly a medical doctor, if a child swallowed a small object.

INSTALLATION INSTRUCTIONS

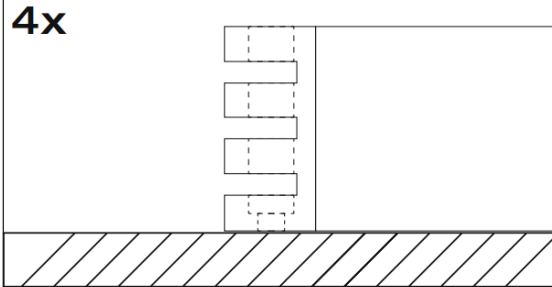
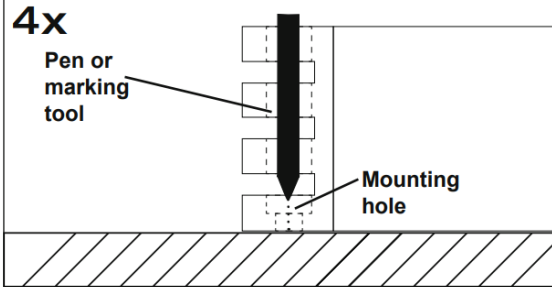
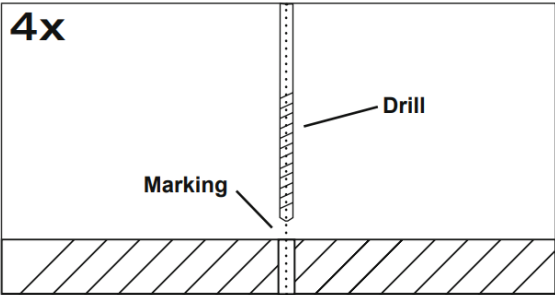
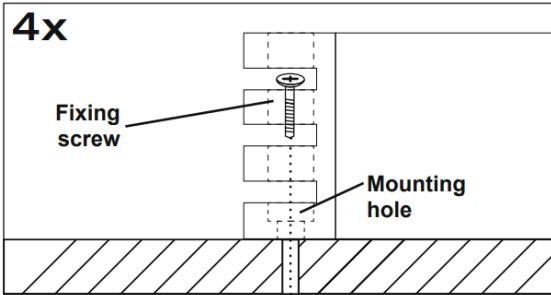


NOTE

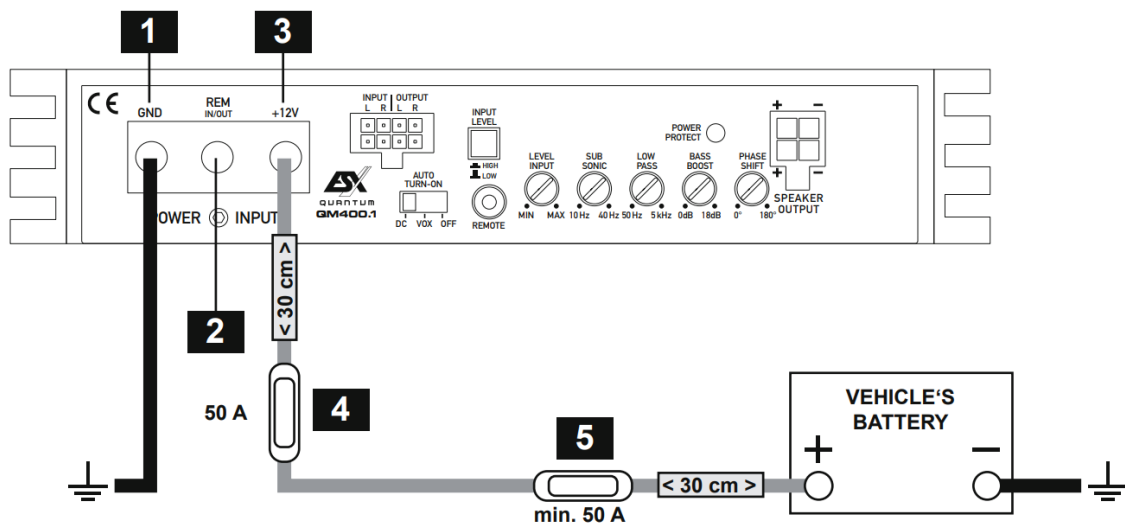
Before you start with the installation of the sound system, disconnect necessarily the GROUND connection wire from the battery to avoid any risk of electric shocks and short circuits.

MECHANICAL INSTALLATION

Avoid any damage to the components of the vehicle like airbags, cables, board computers, seat belts, gas tanks or the like. Ensure that the chosen location provides sufficient air circulation for the amplifier. Do not mount the device in small or sealed spaces without air circulation nearby heat dispersing parts or electrical parts of the vehicle. Do not mount the amplifier on top of a subwoofer box or any other vibrating parts, whereby parts could loosen inside. The wires and cables of the power supply and the audio signal must be as short as possible to avoid any losses and interferences.

<div><div>1</div><div>4x</div></div>	<div><div>2</div><div>4x</div><div>Pen or marking tool</div><div>Mounting hole</div></div>
<p>First you need to find a suitable installation location for the amplifier. Ensure that enough space for the installation of the cables remains and that they will not be bent and have sufficient pull relief.</p>	<p>Keep the amplifier at the chosen mounting location in the vehicle. Then mark the four drill holes with an appropriate pen or marking tool through the designated mounting holes at the amplifier.</p>
<div><div>3</div><div>4x</div><div>Drill</div><div>Marking</div></div>	<div><div>4</div><div>4x</div><div>Fixing screw</div><div>Mounting hole</div></div>
<p>Lay the amplifier aside and then drill the holes for the mounting screws at the marked locations. Please ensure not to damage any components of the vehicle while you drilling the holes. Alternatively (depending on the material of the surface) you can also use self-tapping screws.</p>	<p>Then uphold the amplifier to the chosen position and fix the screws through the mounting holes into the drilled screw holes. Ensure that the mounted amplifier is tightly fixed and can not come loose while driving.</p>

ELECTRICAL INTERCONNECTION



BEFORE CONNECTING

For the professional installation of a sound system, car audio retail stores offer appropriate wire kits. Ensure a sufficient profile section, a suitable fuse rating, and the conductivity of the cables when you purchase your wiring kit. Clean and remove rust-streaked and oxidized areas on the contact points of the battery and the ground connection. Make sure that all screws are fixed tight after the installation because loose connections cause malfunctions, insufficient power supply or interferences. Do not set in the fuse until the installation is accomplished.

1 GND

Connect the GND terminal with a suitable contact ground point on the vehicle's chassis. The ground wire must be as short as possible and must be connected to a blank metallic point at the vehicle's chassis. Ensure that this ground point has a stable and safe electrical connection to the negative “-” pole of the battery. Check this ground wire from the battery to the ground point if possible and enforce it if required. Use a ground wire with a sufficient cross-section and the same size as the plus (+12V) power supply wire.

2 REM IN/OUT

Connect a turn-on signal (e.g. automatic antenna) or the turn-on remote signal of your head unit (REM) with the REM IN/OUT terminal of the amplifier. Use therefore a suitable cable with a sufficient cross-section (0,5 mm²). Hereby the amplifier turns on or off with your head unit.

If you use the AUTO TURN-ON function, the REM IN/OUT terminal does not need to be connected. However, the REM IN/OUT terminal can then be connected to the REM terminal of another amplifier to provide a control signal to it (REM OUT function).

3 +12V

Connect the +12V terminal with the +12V pole of the vehicle's battery. Use a suitable cable with a sufficient cross-section.

4 FUSE

The amplifier inherently has no internal device fuse. Use the supplied fuse (50 A) with the fuse holder and install it in the power cable between the 12 Volt positive pole of the vehicle battery and the +12V terminal of the amplifier. The distance between the fuse and the amplifier should not exceed 30 cm.

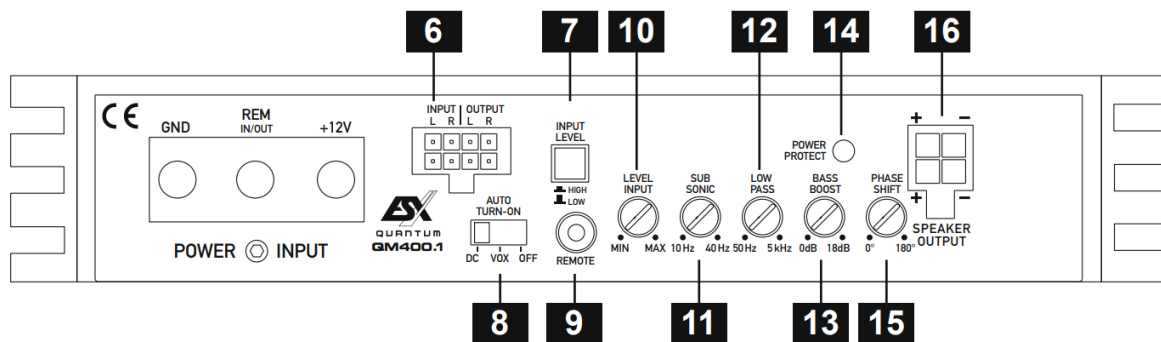
5 ADDITIONAL CABLE FUSE (OPTIONAL)

Install an extra fuse (at least 50 A, not included) for the +12V power cable near the battery. The distance between the fuse and the battery should not exceed 30 cm.

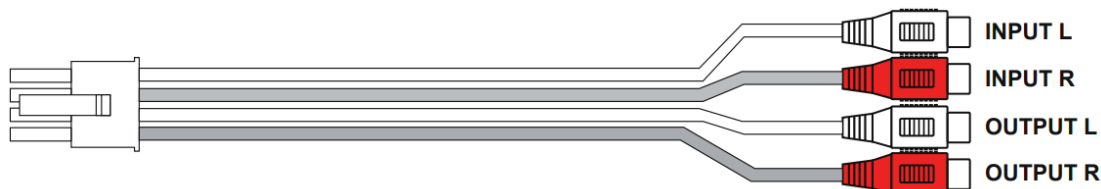
Replace defective fuses only with a new one of the same type and with the same fuse rating.

FUNCTIONAL INSTRUCTIONS

OPERATING ELEMENTS



6 Connect the INPUT RCA jacks of the included wire harness with the head unit by using appropriate audio signal cables. Make sure that the INPUT LEVEL push button (# 7) is in a LOW position (not pushed)



If your head unit does not have RCA preamp outputs, you can use the amplifier's high-level inputs as signal input. Make sure that the INPUT LEVEL push button (# 7) is in the HIGH position (pushed). Simply connect the loudspeaker cables of the head unit to the enclosed wire harness as follows:



The OUTPUT RCA jacks of both wire harnesses provide a linear full-range audio signal for driving additional amplifiers.

7 The INPUT LEVEL push-button determines whether the signal inputs are to be operated with a low-level signal or a high-level signal.

8 If your head unit does not have a turn-on signal (REM), you can use the automatic turn-on function of the amplifier. This works in two ways, which can be set at the AUTO TURN-ON switch:

DC: This method only works if you use the amplifier's HIGH-LEVEL INPUT. The amplifier then detects a voltage rise to 6 volts when the head unit is turned on by a so-called "DC offset" and then turns on the amplifier.

VOX: Select this method when using the INPUT RCA jacks. The amplifier then detects a voltage increase in the incoming audio signal when switching on the head unit via the attached RCA cable and then switches on the amplifier.

Note: As soon as the head unit is switched off again, the amplifier switches itself off. The terminal for the amplifier turn-on (page 15#2, REM IN/OUT) can now be used to supply additional amplifiers with a turn-on signal. Simply connect the REM terminals of the two amplifiers and make sure that the other amplifier is in "normal" turn-on mode, which means that the AUTO TURN ON function is disabled.

9 The REMOTE port is for connecting the cable of the included bass level remote controller. With this, the bass level can be e.g. adjusted from the driver's seat. Only use the supplied bass remote controller and the associated cable. The bass level remote controller only works in LP/BP mode.

10 The LEVEL INPUT controller determines the input sensitivity (adaptation to the output signal of the head unit). The controller range is between 5 volts (MIN) and 0.2 volts (MAX).

11 The SUB SONIC controller limits the ultra-low and not audible frequencies of the audio signal downwards to avoid mechanical and electrical overloading on the subwoofer. The cut-off frequency is adjustable from 10 to 40 Hz and depends on the size of the subwoofer. If this controller is adjusted higher than the LOW PASS controller, no sound is audible.

12 The LOW PASS controller determines the frequency cut-off upwards. The crossover frequency is continuously variable from 50 Hz to 5000 Hz.

13 The BASS BOOST controller adjusts the bass boost continuously from 0 dB to +18 dB at 40 Hz on channel pair 3/4.

NOTE: Always use this controller with care. A permanently too high bass boost could damage your speakers!

14 If the POWER/PROTECT is blue, the amplifier is ready for operation. If the POWER/PROTECT is red, there is a malfunction. Refer in this case to the section TROUBLESHOOTING.

15 The PHASE SHIFT controller allows adjusting the phase between 0° and 180°. Hence, you are able to adjust the subwoofer perfectly to the vehicle's acoustics.

16 To connect the speaker cables, use the enclosed wire harness and plug it into the SPEAKER OUTPUT connector.



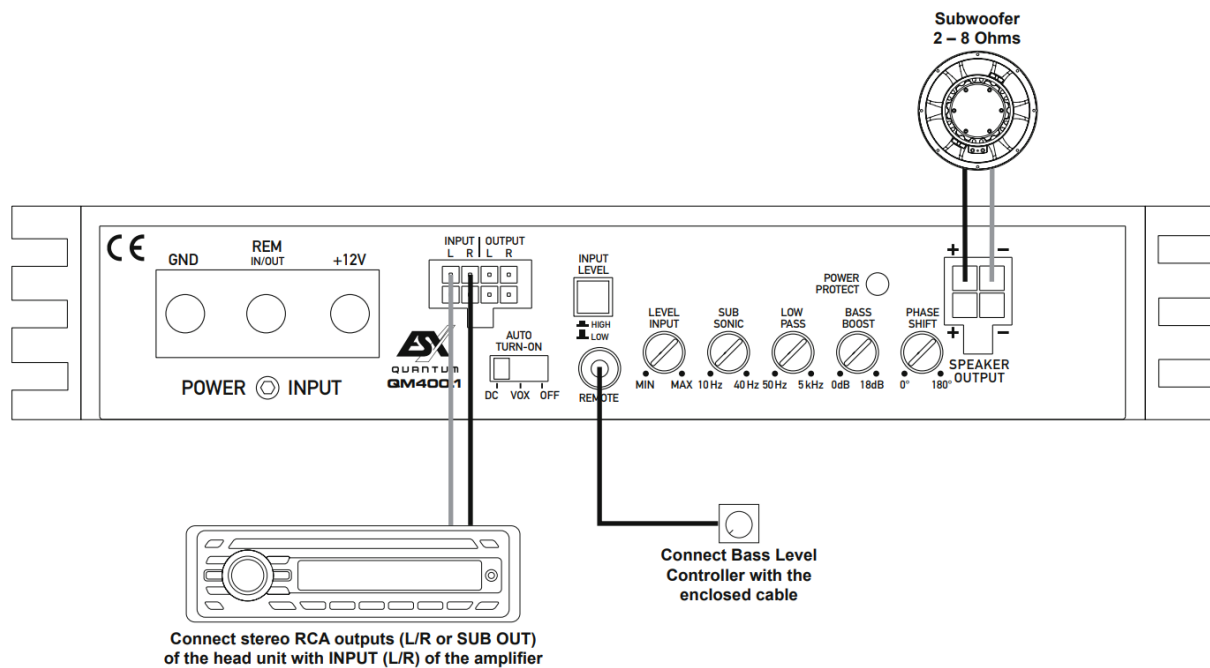
NOTE

Installation of RCA/Audio signal cables and power supply cables.

Ensure while installation not to lead the audio cables between the head unit and the amplifier together with the power supply wires on the same side of the vehicle. The best is a real separated installation on the left and right cable channels of the vehicle to avoid interferences on the audio signal. This stands also for the enclosed bass-remote wire, which should not be installed together with the power supply wires.

INTERCONNECTION EXAMPLE

1-channel-mode: 1 x Mono Subwoofer



INTERCONNECTION

- Connect the RCA outputs of the head unit with the RCA jacks INPUT (L /R) of the amplifier with appropriate high-value RCA cables by using the included wire harness.
If a separate SUB OUT from your head unit is available, use this as line output.
- Connect the subwoofer with the SPEAKER OUTPUTS by using the included wire harness.
- Always ensure that the total impedance load is not lower than 2 ohms. Too low impedance causes a high temperature and will shut down the amplifier operation.
- Always ensure the correct polarity of the speakers. The interchange of plus and minus causes total loss of

bass playback and could damage the speakers.

FILTER SETTINGS & BASS BOOST CONTROLLER

- The cut-off frequency is adjustable with the LOW PASS controller and should be set between 60 to 100 Hz, depending on the size of the subwoofer. The SUB SONIC controller eliminates the ultra-low, not audible frequencies to generate a bandpass signal. The subsonic frequency should be set between 15 to 40 Hz, depending on the size of the subwoofer.

Note: If this value is higher than the LOW PASS setting, no sound is audible.

- The BASS BOOST controller allows a bass enhancement up to +18 dB.

LEVEL CONTROLLER

- Turn the LEVEL INPUT controller of the amplifier to the MIN position.
- Turn the volume controller of the head unit to 80 – 90% of its full setting.
- Turn the LEVEL INPUT controller clockwise until you hear some distortion.
- Then turn back the LEVEL INPUT controller slightly until you hear a cleaner sound.

BASS REMOTE

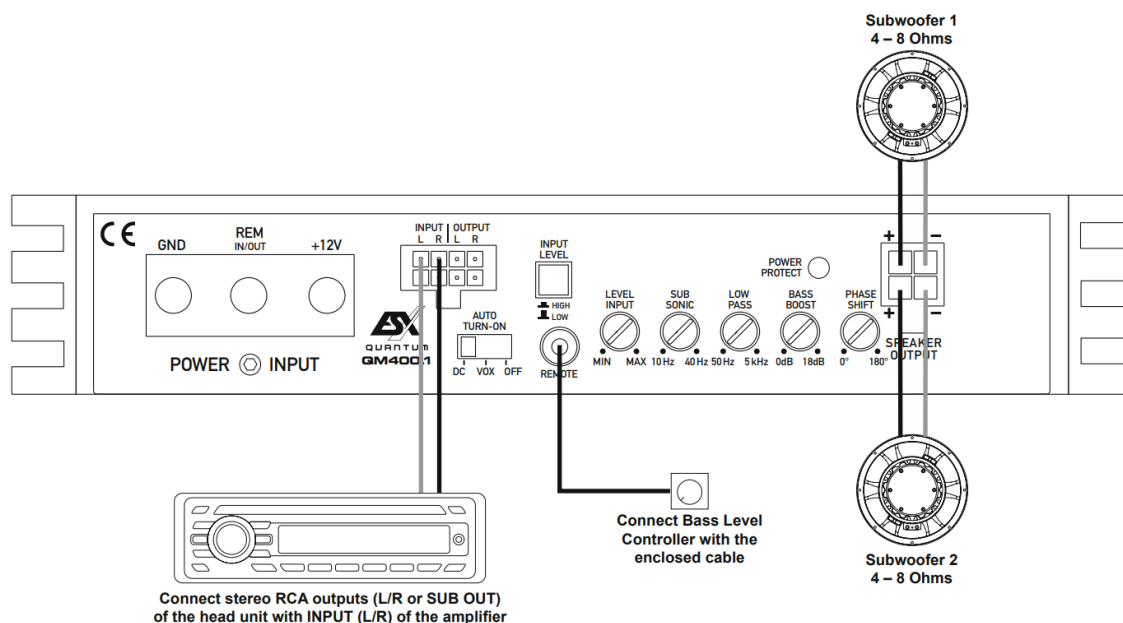
- The enclosed BASS REMOTE CONTROLLER adjusts the bass level e.g. from the driver's seat. Please use only the enclosed bass remote controller and cable.



NOTE

Do not connect loudspeaker cables with the vehicle's chassis. Always ensure the correct polarity of all connections.

1-channel-mode: 2 x Mono Subwoofer



INTERCONNECTION

- Connect the RCA outputs of the head unit with the RCA jacks INPUT (L /R) of the amplifier with appropriate high-value RCA cables by using the included wire harness.

If a separate SUB OUT from your head unit is available, use this as line output.

- Connect the subwoofer with the SPEAKER OUTPUTS by using the included wire harness.
- Always ensure that the total impedance load is not lower than 4 ohms. Too low impedance causes a high temperature and will shut down the amplifier operation.
- Always ensure the correct polarity of the speakers. The interchange of plus and minus causes total loss of bass playback and could damage the speakers.

FILTER SETTINGS & BASS BOOST CONTROLLER

- The cut-off frequency is adjustable with the LOW PASS controller and should be set between 60 to 100 Hz, depending on the size of the subwoofer. The SUB SONIC controller eliminates the ultra-low, not audible frequencies to generate a bandpass signal. The subsonic frequency should be set between 15 to 40 Hz, depending on the size of the subwoofer.

Note: If this value is higher than the LOW PASS setting, no sound is audible.

- The BASS BOOST controller allows a bass enhancement up to +18 dB.

LEVEL CONTROLLER

- Turn the LEVEL INPUT controller of the amplifier to the MIN position.
- Turn the volume controller of the head unit to 80 – 90% of its full setting.
- Turn the LEVEL INPUT controller clockwise until you hear some distortion.
- Then turn back the LEVEL INPUT controller slightly until you hear a cleaner sound.

BASS REMOTE

- The enclosed BASS REMOTE CONTROLLER adjusts the bass level e.g. from the driver's seat. Please use only the enclosed bass remote controller and cable.



NOTE

Do not connect loudspeaker cables with the vehicle's chassis. Always ensure the correct polarity of all connections.

TROUBLESHOOTING

ELECTRICAL INTERFERENCES

The reason for interferences is mostly the routed cables and wires. Especially the power and audio cables (RCA) of your sound system are vulnerable. Often these interferences are caused by electric generators or other electrical units (fuel pump, AC, etc.) of the car. Most of these problems can be prevented by correct and careful wiring.

Here are some courtesy notes:

1. Use only double or triple shielded audio RCA cables for the connection between the amplifier and head unit. A

useful alternative are represented by anti-noise devices or additional ancillary equipment like Balanced Line transmitters, which you can purchase at your car audio retailer. If possible do not use anti-noise filters, which are splicing the ground of the RCA audio cables.

2. Do not lead the audio cables between the head unit and the amplifier together with the power supply wires on the same side of the vehicle. The best is a real separated installation on the left and right cable channels of the vehicle. Then the overlapping of interferences on the audio signal will be avoided. This stands also for the enclosed bass-remote wire, which should not be installed together with the power supply wires.
3. Avoid ground loops by connecting all ground connections in a starlike arrangement. The suitable ground center point is ascertainable by measuring the voltage directly on the vehicle's battery with a multi-meter. You should measure the voltage with turned-on ignition (acc.) and with other turned-on power consumers (e.g. headlights, rear window defroster, etc.). Compare the measured value with the voltage of the ground point you have chosen for the installation and the positive pole (+12V) of the amplifier. If the voltage has just a little difference, you have found a suitable ground point. Otherwise, you need to choose another ground point.
4. Use if possible only cables with added or soldered cable sockets or the like. Gold-plated or high-value nickel-plated cable sockets are corrosion-free and own a very low contact resistance.

PROTECTION CIRCUIT

This amplifier owns a 3-way protection circuit. On overloading, overheating, shorted loudspeakers, too low impedance or insufficient power supply, the protection circuit turns off the amplifier to prevent serious damage. If one of these malfunctions is detected, the POWER/ PROTECT LED lights up red. In this case, check all connections to detect short-circuits, faulty connections or overheating. Refer to the notes on the next page. If the reason for the dysfunction is eliminated, the amplifier is ready for operation again.

If the red POWER/PROTECT LED does not stop to light up in red, the amplifier is damaged. In this case, return the amplifier to your car audio retailer with a detailed malfunction description and a copy of the proof of purchase.

WARNING: Never open the amplifier and try to repair it by yourself. This causes a loss of warranty. The repairing service should be made only by skilled technicians.

INSTALLATION AND OPERATION IN NEWER VEHICLES!

In many vehicles (since approx. 2002) computer-controlled diagnosis- and controlling systems are applied – like CAN-BUS or MOST-BUS interfaces. With the installation of a car audio amplifier, a new appliance will be added to the 12V onboard electrical system, which may cause under several circumstances error messages or may interrupt the factory-made diagnosis system, as a result of high-stress peaks and higher power consumption. Thus, depending on the model and manufacturer, the driving safety or important security systems like airbags, ESC or others could be interrupted.

If you plan to operate the amplifier in a vehicle like described above, please follow these instructions:

- Let the installation be made only by a skilled specialist or a service station, which is specialized in the maintenance of your vehicle.
- After the installation, we suggest making a computer diagnosis of the onboard system, to detect possible malfunctions or errors.
- If the onboard system is interfered with by the installation of the amplifier, an additionally installed power capacitor can stabilize the electrical onboard system to ensure a proper and stable operation.
- The best solution is the integration of an own additional 12 V electrical system for the sound system, which can be operated independently with its own battery supply.

CONSULT YOUR CAR SPECIALIZED SERVICE STATION!

Malfunction: no function Reason:

Reason:	Remedy:
1. The power supply connection of the device is not correct 2. The cables have no mechanical or electrical contact 3. The remote turn-on connection from the head unit to the amplifier is not correct 4. Defective Fuses. In case of replacing the fuses, ensure the correct fuse rating	Recheck Replace cables Replace speakers Turn down controller Check head unit settings

Malfunction: no signal on loudspeakers, but the POWER/PROTECT LED lights up blue Reason:

Reason:	Remedy:
1. The balance or fader controller of the head unit is not in the center-position 2. The connections of the speakers are not correct 3. The loudspeakers are defective 4. SUB SONIC controller is adjusted to high	Turn to center-position Recheck Replace speakers Turn down controller

Malfunction: distortions on the loudspeakers

Reason:	Remedy:
1. The loudspeakers are overloaded	Turn down the level Turn down the level on the head unit Switch off loudness on the head unit Reset bass EQ on the head unit

Malfunction: No bass or stereo sound

Reason:	Remedy:
1. Interchange of loudspeaker cable polarity 2. The RCA audio cables are loose or defective	Reconnect Reconnect or replace the cables

Malfunction: amplifier runs into protection mode (POWER/PROTECT LED lights up red)

Reason:	Remedy:
1. Short circuit on the loudspeakers or cables 2. Overheated by too low speaker impedance 3. Insufficient air circulation by an inappropriate mounting position of the amplifier 4. Overloaded by an insufficient power supply (too small profile section on the power cables)	Reconnect Choose a higher impedance Use a new speaker setup Change the mounting position Ensure air circulation Use a bigger profile section

Malfunction: hiss or white noise on the loudspeakers

Reason:	Remedy:
1. The level controllers are turned up to loud 2. The treble controller on the head unit is turned up 3. The speaker cables or the RCA audio cables are defective 4. The hissing is caused by the head unit	Turn down the level Turn down the level on the head unit Replacing the cables Check the head unit



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Documents / Resources

	ESX QUANTUM QM400.1 Class D Mono Amplifier [pdf] Owner's Manual QM400.1 Class D Mono Amplifier, QM400.1, Class D Mono Amplifier
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References

- [ESX - Car Audio Systems](#)