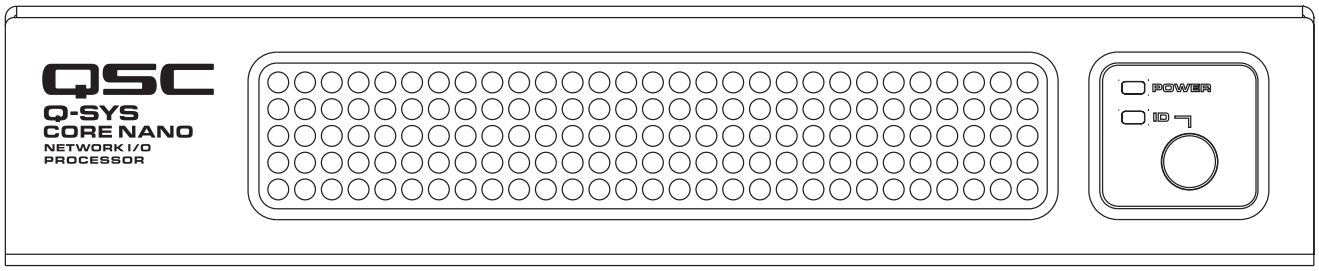
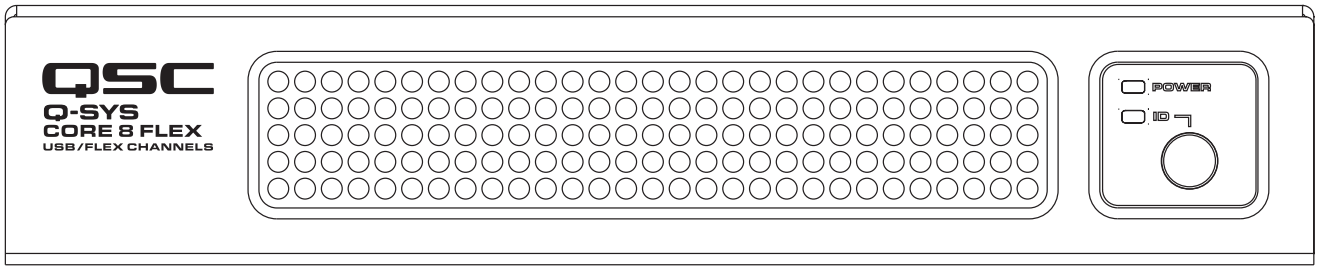
Q-SYS™

QSC®

Hardware User Manual

CORE NANO - NETWORK I/O PROCESSOR
CORE 8 FLEX - USB/FLEX CHANNELS





TD-001615-00-B

EXPLANATION OF TERMS AND SYMBOLS

The term “WARNING!” indicates instructions regarding personal safety. If the instructions are not followed the result may be bodily injury or death.

The term “CAUTION!” indicates instructions regarding possible damage to physical equipment. If these instructions are not followed, it may result in damage to the equipment that may not be covered under the warranty.

The term “IMPORTANT!” indicates instructions or information that are vital to the successful completion of the procedure.

The term "NOTE" is used to indicate additional useful information.

The intent of the lightning flash with arrowhead symbol within an equilateral triangle is to alert the user to the presence of un-insulated "dangerous" voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The intent of the exclamation point within an equilateral triangle is to alert the user to the presence of important safety, and operating and maintenance instructions in this manual.

IMPORTANT SAFETY INSTRUCTIONS

WARNING! TO PREVENT FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.
Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than room ambient. Consideration should be given to ensure that the maximum operating temperature range 0°C to 50°C (32°F to 122°F) is not exceeded. **Reduced Air Flow** – Installation of the equipment in a rack should be such that the amount of airflow required for safe operation of the equipment is not compromised.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Do not submerge the apparatus in water or liquids.
7. Do not use any aerosol spray, cleaner, disinfectant or fumigant on, near or into the apparatus.
8. Clean only with a dry cloth.
9. Do not block any ventilation opening. Installation next to another unit within a rack should allow sufficient air flow required for safe operation.
10. Keep the side ventilation openings free of dust or other matter.
11. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
12. To reduce the risk of electrical shock, the power cord shall be connected to a mains socket outlet with a protecting earthing connection.
13. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
14. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
15. Do not unplug the unit by pulling on the cord, use the plug.
16. Only use attachments/accessories specified by the manufacturer.
17. Unplug this apparatus during lightning storms or when unused for long periods of time.
18. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
19. The appliance coupler or the AC Mains plug is the AC mains disconnect device and shall remain readily accessible after installation.
20. Adhere to all applicable local codes.
21. Consult a licensed, professional engineer when in doubt or questions arise regarding a physical equipment installation.

Maintenance and Repairs

WARNING!: Advanced technology, e.g., the use of modern materials and powerful electronics, requires specially adapted maintenance and repair methods. To avoid a danger of subsequent damage to the apparatus, injuries to persons and/or the creation of additional safety hazards, all maintenance or repair work on the apparatus should be performed only by a QSC authorized service station or an authorized QSC International Distributor. QSC is not responsible for any injury, harm or related damages arising from any failure of the customer, owner or user of the apparatus to facilitate those repairs.

Limited Battery Warning

WARNING!: THIS EQUIPMENT CONTAINS A NON-RECHARGEABLE LITHIUM BATTERY. LITHIUM IS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR BIRTH DEFECTS. THE NON-RECHARGEABLE LITHIUM BATTERY CONTAINED IN THIS EQUIPMENT MAY EXPLODE IF IT IS EXPOSED TO FIRE OR EXTREME HEAT. DO NOT SHORT CIRCUIT THE BATTERY. DO NOT ATTEMPT TO RECHARGE THE NON-RECHARGEABLE LITHIUM BATTERY. THERE IS A RISK OF EXPLOSION IF THE BATTERY IS REPLACED BY AN INCORRECT TYPE.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Expected Product Life Cycle: 20 years, **Storage Temperature range:** –20°F to +70°F, **Relative Humidity:** range of 5 - 85% RH non-condensing.

Warranty

For a copy of the QSC Limited Warranty, visit the QSC, LLC., website at www.qsc.com.

Para una copia de la Garantía Limitada de QSC, visite el sitio web de QSC, LLC., en www.qsc.com.

Pour obtenir une copie de la garantie limitée de QSC, visitez le site de QSC, LLC., à www.qsc.com.

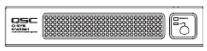
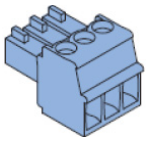
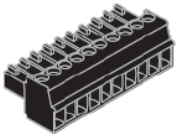
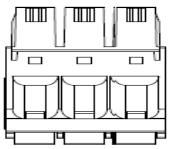
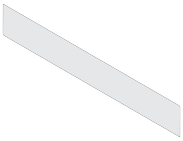
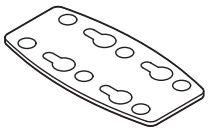
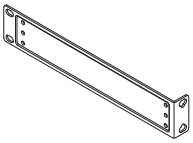
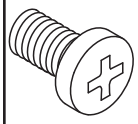
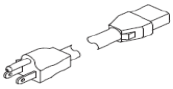
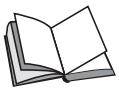
Besuchen Sie die Webseite von QSC, LLC. (www.qsc.com) um eine Kopie der beschränkten Garantie von QSC zu erhalten.

Para uma cópia da garantia limitada da QSC visite o site da QSC, LLC., em www.qsc.com.

RoHS Statement

The QSC Q-SYS Core 8 FLEX Series is in compliance with European Directive 2011/65/EU – Restriction of Hazardous Substances (RoHS2).

What's in the Box

 (1x) Q-SYS Core 8 FLEX or Q-SYS Core NANO	 (8x) Flex Channels (blue) Core 8 FLEX only	 (2x) GPIO (black) Core 8 FLEX only	 (2x) RS232 Tx/Rx (black)
 (2x) Rack-Ear Cover Label	 (2x) Joining Plate	 (2x) Rack Spacer Plate	 (2x) Rack Ear
 (6x) Phillips Pan Head M4 x 7 mm	 (6x) Phillips Flathead M3 x 6 mm	 (1x) AC Power cord	 (4x) Foam Spacer
 (1x) QSC Warranty TD-000453	 (1x) Safety and Regulatory Statements TD-001616-00-A		

Introduction

The Q-SYS™ Core 8 FLEX is the ideal processing solution for today's smaller and dynamic spaces that utilize an increasing number of network I/O endpoints, yet still require some highly flexible analog audio and general purpose I/O for legacy device integration.

The Q-SYS™ Core NANO offers purely network AV&C processing designed to support centralized processing for multiple rooms and/or installations that rely solely on networked, IP-based endpoints providing a significant cost savings in applications not requiring analog I/O on the processor.

These platforms extend Q-SYS' reach into more modest every-day projects leveraging all the features available across the entire Ecosystem for use in applications ranging from Acoustic Echo Canceling (AEC) and sound reinforcement in small to medium meeting or multipurpose rooms, sound reinforcement in performance venues such as house of worship and theater, background music systems to paging in airports, convention centers and hospitals.

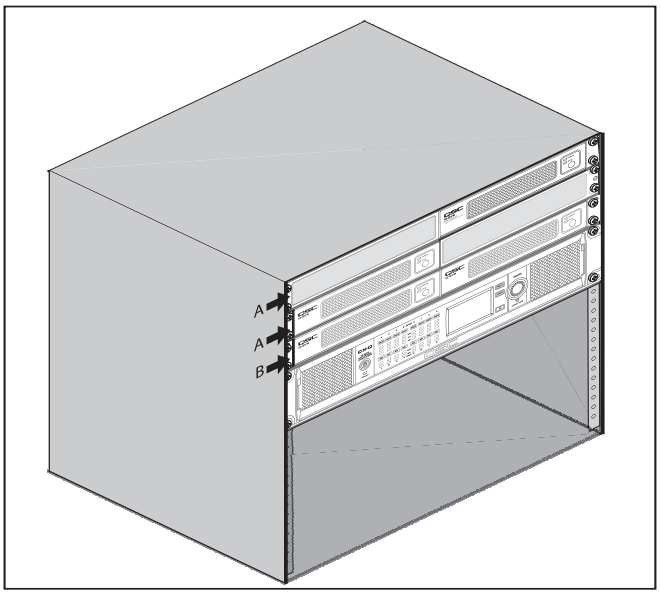
The Core 8 FLEX and Core NANO are multipurpose software-based audio and control processors in a compact form factor. Core 8 FLEX features a bank of 8 patented FLEX Channels, each channel independently configured during design or run time as either a microphone/line level input or a line level output while the Core NANO utilizes purely network-based I/O. The Core 8 FLEX and Core NANO combine class leading power and flexibility with specialized I/O such as VoIP, Internal Solid State Drive Playback/Recording and USB audio I/O plus USB A/V bridging.

The Cores' USB device connections enable the processors to appear in a Microsoft Windows or macOS host operating system simultaneously as both a USB Audio, Video and Communications device supporting up to 8x8 digital audio channels in a flexible, design time configuration environment that can advertise as multiple virtual USB device instances to the host operating system concurrently over a single physical USB connection. Additionally, USB Host ports enable the Cores to host external USB devices and future Q-SYS peripheral products.

Installation

Ventilation

Minimum open space of 6 inches measured from the back of the Q-SYS Core 8 FLEX or Core NANO.



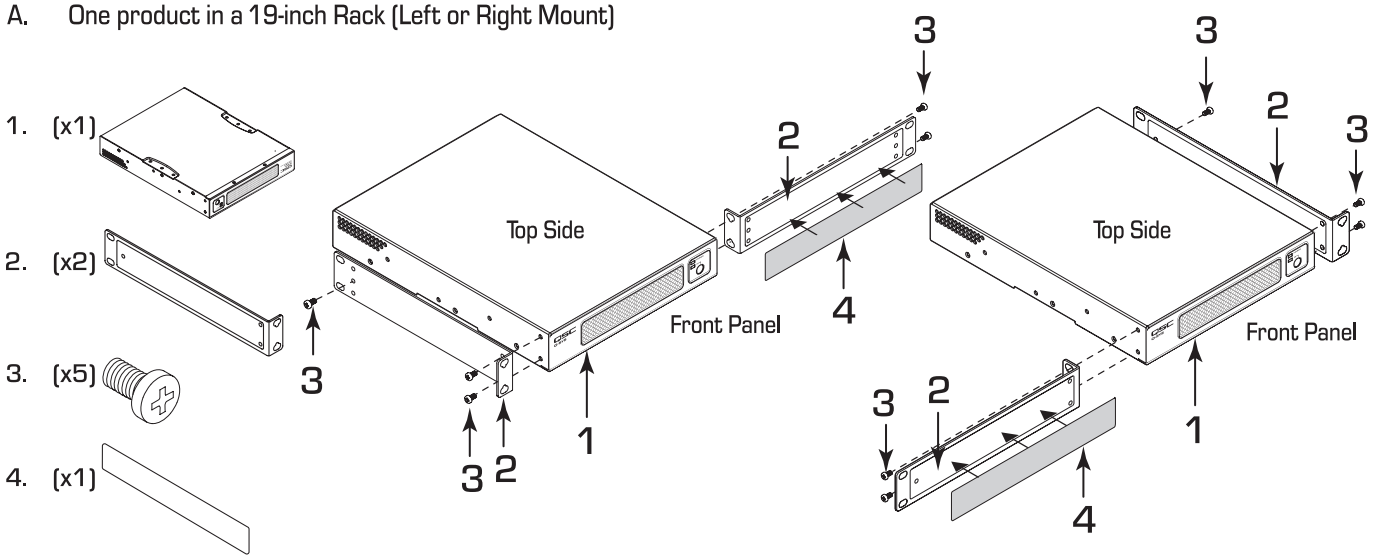
NOTE: In order to provide adequate dissipation of heat, keep the space directly to the rear of the Q-SYS Core 8 FLEX or Core NANO free of obstacles.

Select the Installation Configuration

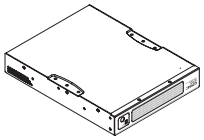
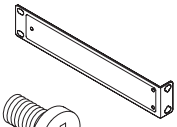
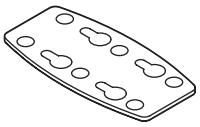
Choose one of the following configuration options:

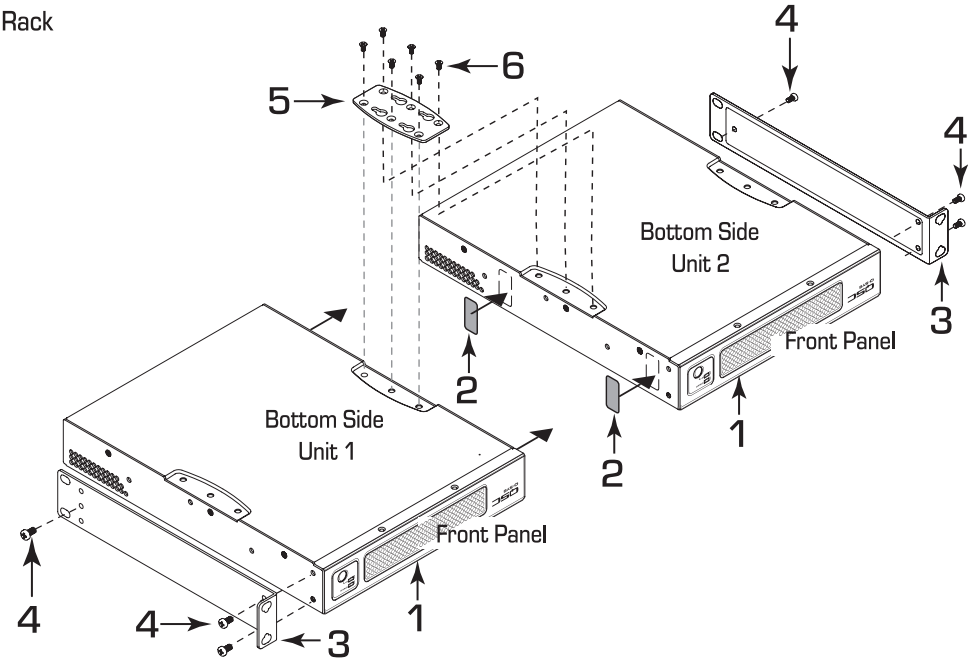
- **A.** One Core 8 FLEX or Core NANO 19-inch Rack (Left or Right Mount)
- **B.** Two Core 8 FLEXes or Core NANOs 19-inch Rack
- **C.** One Core 8 FLEX or Core NANO Half Rack
- **D.** Under Table or on Wall

A. One product in a 19-inch Rack (Left or Right Mount)

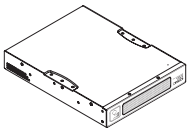
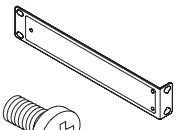


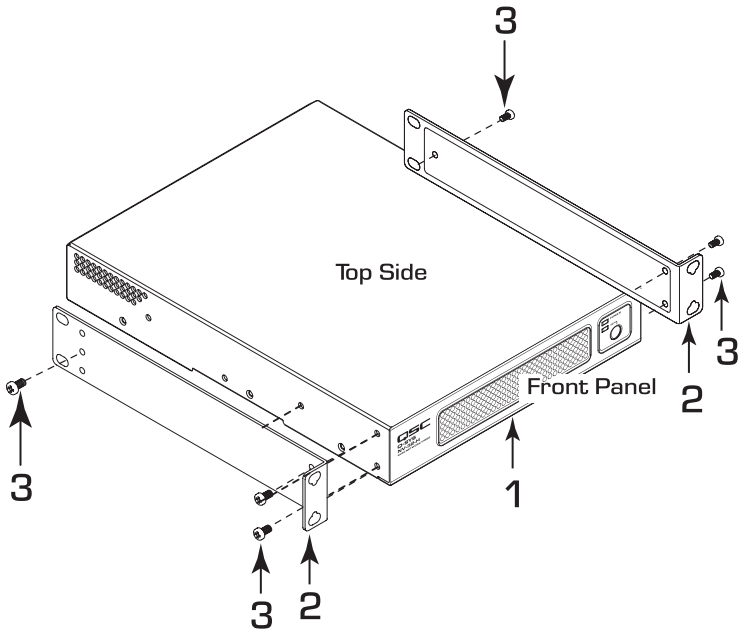
B. Two products in a 19-inch Rack

1. (x2) 
2. (x2) 
3. (x2) 
4. (x6) 
5. (x1) 
6. (x6) 

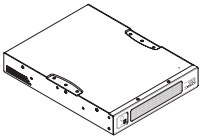
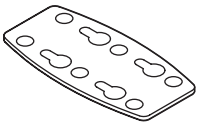


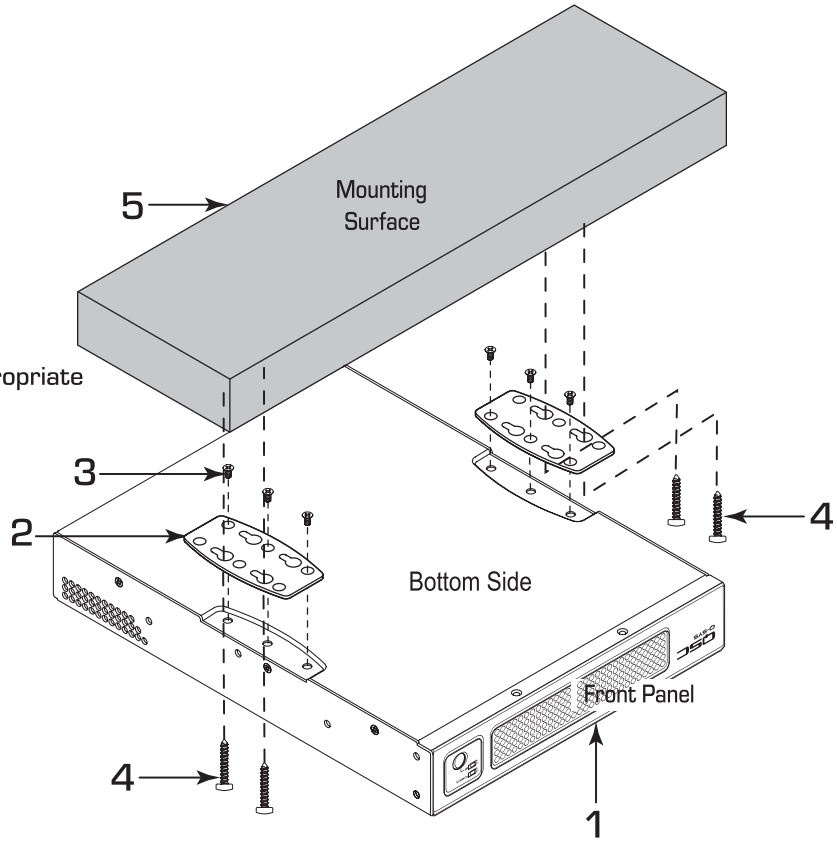
C. One product in a Half Rack

1. (x1) 
2. (x2) 
3. (x6) 



D. Under Table or on Wall

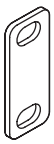
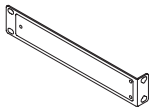
1. (x1) 
2. (x2) 
3. (x6) 
4. (x4)  Not supplied – use appropriate screws for mounting surface.
5. Mounting Surface

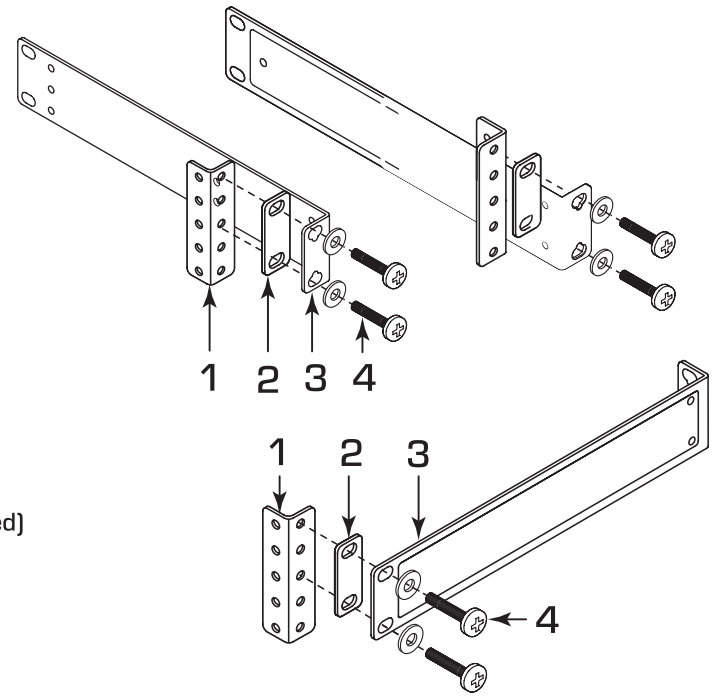


Rack Mounting Options

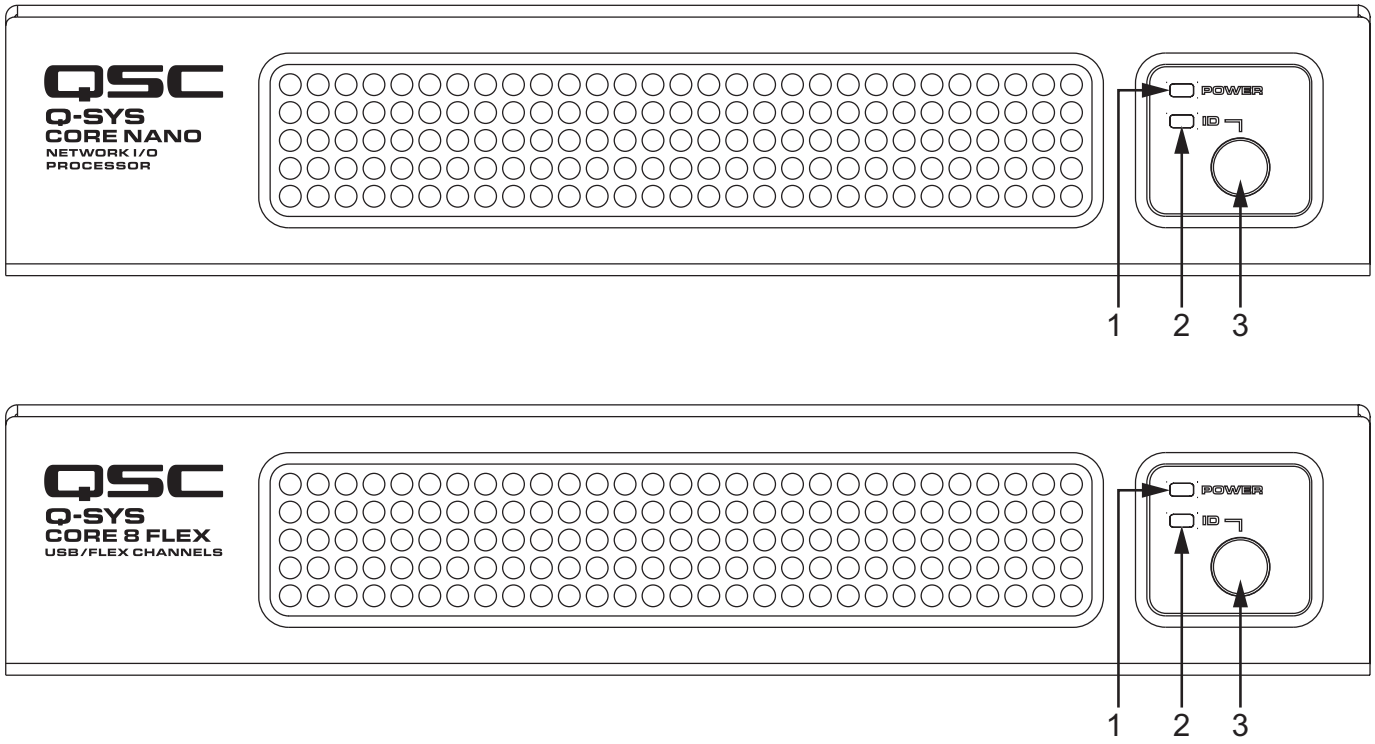
All Confgurations

Using the examples shown in mounting options A through D.

1. Equipment Rack (not supplied)
2. (2) Rack Ear Spacer 
3. (2) Rack Ear 
4. (4) Rack-Mounting Screws and Washers (not supplied)

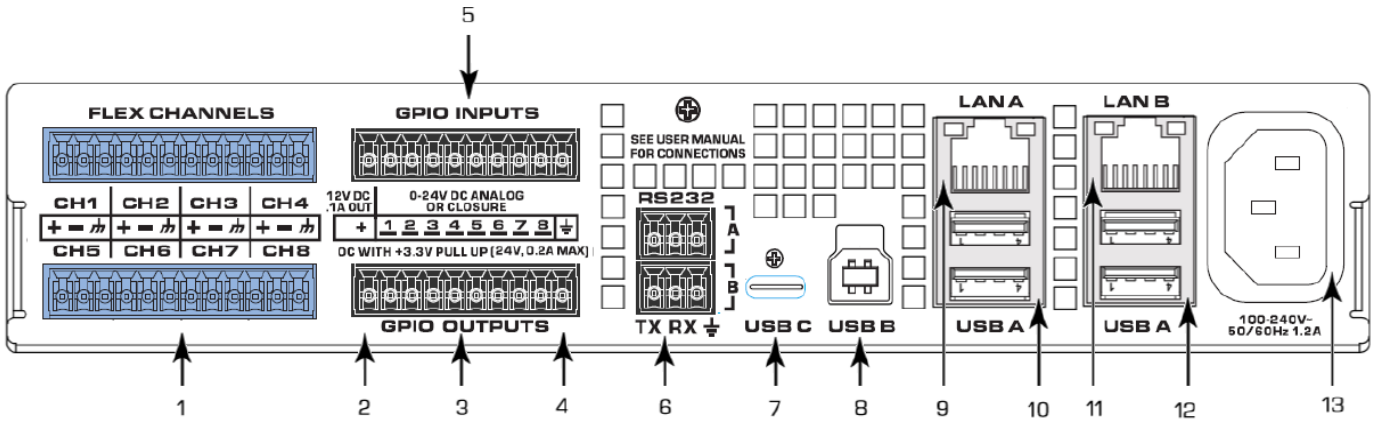


Front Panels



1. **Power LED** – illuminates blue when the Q-SYS Core 8 FLEX is powered on
2. **ID LED** – LED blinks when placed into ID Mode via ID Button or Q-SYS Configurator Software
3. **ID Button** – Locates the Q-SYS Core 8 FLEX in Q-SYS Designer GUI and Configurator. Pressing the ID button for approximately 10 seconds invokes "Reset Network Settings" function.

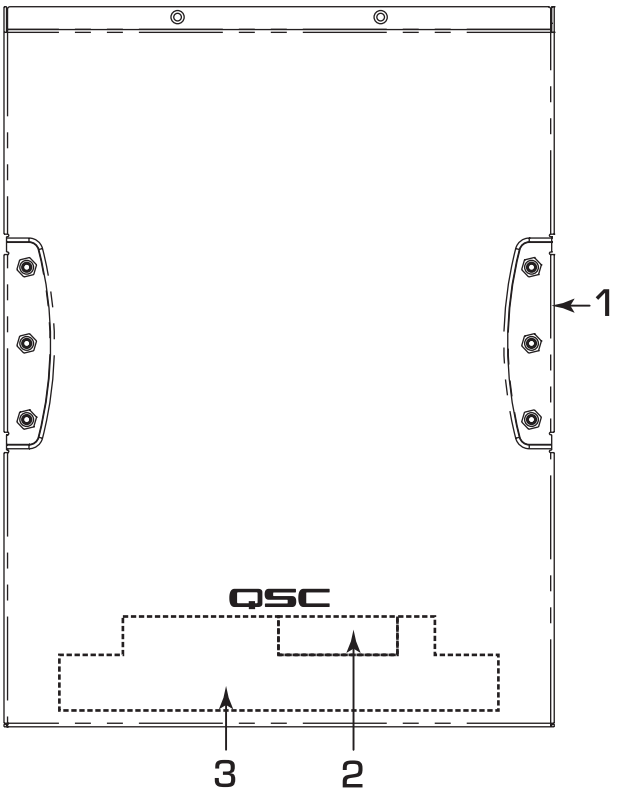
Rear Panel



1. **FLEX Channels** – eight user-configurable analog audio input/output channels, phantom power on inputs.
2. **+12 VDC** – up to 0.1A source. Connector pins "+".
3. **GPIO Outputs** – 8 outputs, open collector (24V, 0.2A max.) with p/u to +3.3V (lower pins 1 – 8).
4. **GND** – earth ground. Connector pins with ground symbol.
5. **GPIO Inputs** – 8 inputs, 0-24V analog input or contact closure (upper pins 1 – 8).
6. **RS232** – COM x2. 3-position, 3.5mm connector.
7. **USB Type C** – USB 3.1, Host port or Device port (Device port functionally available when USB Type B not in use).
8. **USB Type B** – USB 3.0, dedicated Device port.
9. **LAN A** – RJ45, 1000 Mbps, primary, Q-LAN, AES67, Dante, VoIP, WAN streaming, control.
10. **USB Type A** – USB 3.0 x2, Host ports.
11. **LAN B** – RJ45, 1000 Mbps, backup, Q-LAN, AES67, Dante, VoIP, WAN streaming, control.
12. **USB Type A** – USB 3.0 x2, Host ports.
13. **AC mains** – IEC 60320, C14 receptacle, universal power in (100V – 240V, 50/60 Hz).

(Note: Q-SYS Core 8 FLEX shown. Q-SYS Core NANO does not include FLEX channels or GPIO)

Bottom



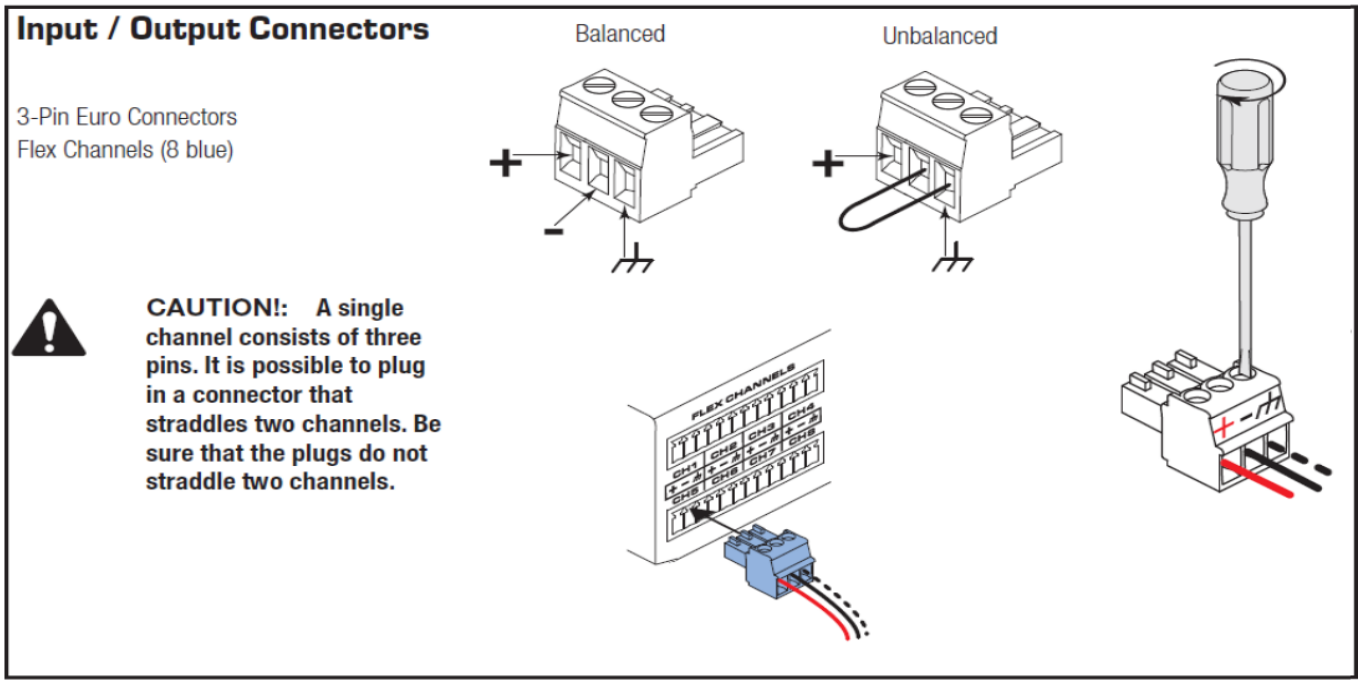
1. **Optional Mounting** – bosses x2 accommodate joining plates for side-by-side or surface mounting installations.

2. **Serial Number** – product serial number.

3. **Agency Declarations**

(Note: Q-SYS Core 8 FLEX and Core NANO share the same bottom attributes)

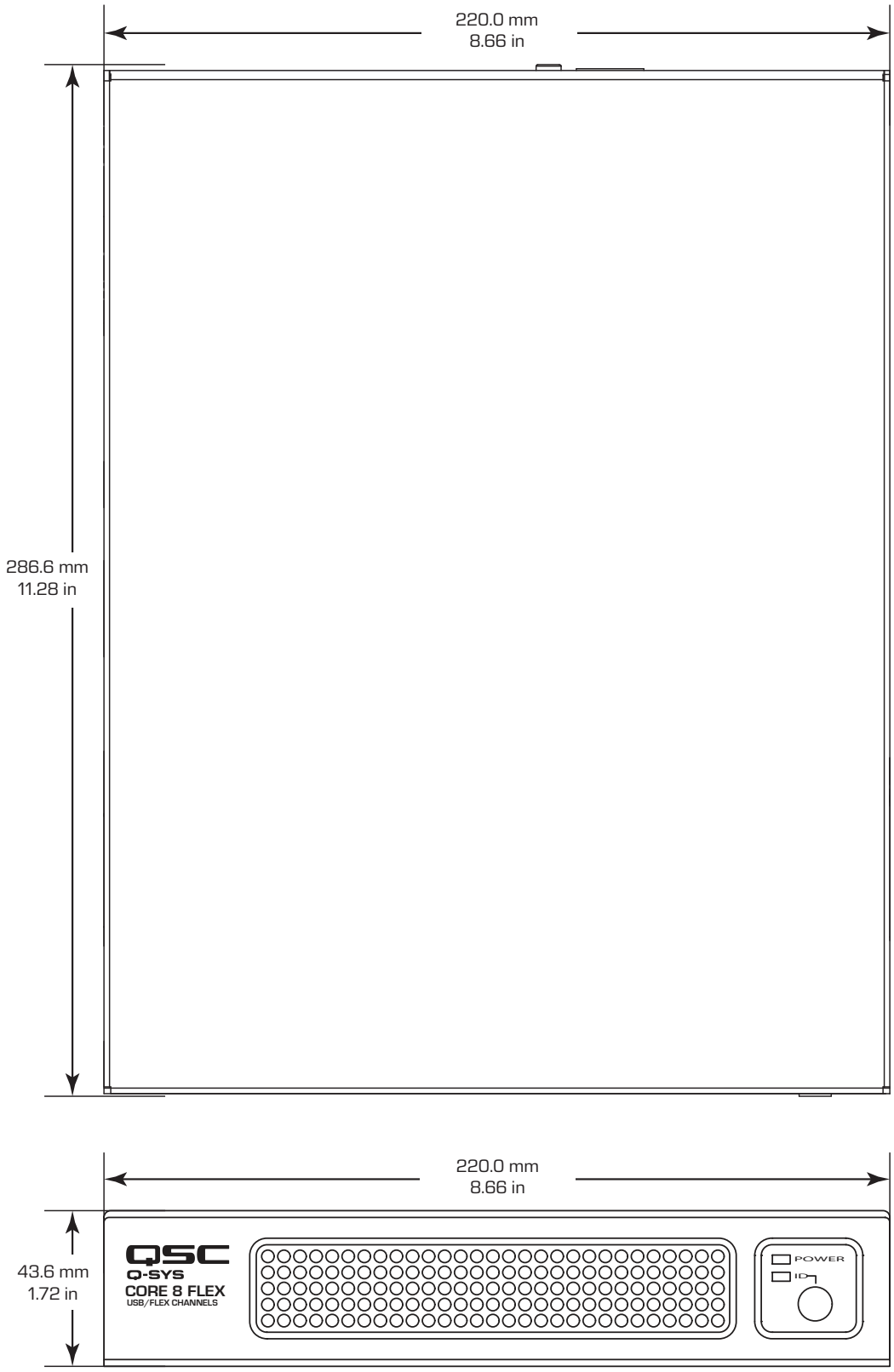
Connections



(Note: For GPIO connections and application examples, refer to "I/O-8 FLEX Technical Note - Using GPIO Inputs and Outputs" available at www.qsc.com.)

Dimensions

(Note: Q-SYS Core 8 FLEX and Core NANO share the same dimensions)



Specifications

Specification	Value
FLEX Audio Inputs (Core 8 FLEX only)	
Input Frequency Response	
20 Hz to 20 kHz @+24 dBU	+0.05 dB/-0.5 dB
Input THD+N @ 1 kHz	
@ +24 dBu sensitivity and +24 dBu input	< 0.004 %
@ -40 dBu sensitivity and -40.5 dBu input	<0.009%
Input to Input Crosstalk @1 kHz	
@+24 dBu sensitivity @+10 dBu sensitivity	<-110 dB Typical, -95 dB Max <-120 dB Typical, -110 dB Max
Input Dynamic Range	
@+24 dBu sensitivity	> 108 dB
@-10 dBu sensitivity	> 105 dB
EIN (no weighting, 20 Hz to 20 kHz)	<-122 dB
Input Impedance (balanced)	10.5 k Ω, nominal
Input Sensitivity Range (1 dB Steps)	-40 dBu to +24 dBu
Maximum Input Level for unbalanced signals	+23 dBu
Phantom Power	IEC 61938 P48 compliant, +48VDC, 10mA per channel
A/D Converters	24-bit, 48 kHz

FLEX Audio Outputs (Core 8 FLEX only)	
Output Frequency Range	
20 Hz to 20 kHz @ all settings	+0.5/-0.3 dB
Output THD, +20 dBu @ 1 kHz	0.007% typical
Output Crosstalk @ 1 kHz	< -102 dB typical, -90 dB max
Output Dynamic Range	> 108 dB
Output Impedance (balanced)	100 Ω, nominal
Output Level Range (1 dB steps)	-40 dBu min to +20 dBu max
D/A Converters	24-bit, 48 kHz

Capacities	
Q-LAN or AES67 Channels	64x64
Core-to-Core Streaming Channels	64x64
Dante Channels	Default = 8x8 (up to 32x32 upgrade available)
WAN/Media Streaming Channels	12x12
AEC Processors	8
Softphone Intances	Up to 2
Network Peripherals (max quantity)	32 (includes native Q-SYS cameras, I/O, NV, TSCs, paging stations, Extensions and plugins with their “Is Managed” property set to “Yes”. It does not include Streaming I/O, Loudspeakers, Scripts or plugins with their “Is Managed” property set to “No”.)
MTP (Multi-Track Player)	Default = 16 (up to 32x32 upgrade available Spring 2021)
Media Drive Storage	Default = 14GB (128GB, 256GB or 512GB upgrades available Spring 2021)

USB Inputs and Outputs	
USB B or USB C (Audio)	
Bit Depth	24-bit
Channel Quantity	8x8

Specification	Value
Sample Rate	48 kHz
USB Audio Device Hosting	Support for standard USB headset, speakerphone on USB type A connection (one device at a time)
Input	
Sample Rate	48kHz or 16kHz, monaural
Bit Resolution	8-bit, 16-bit, 24-bit or 32-bit floating point (IEEE 754)
Format	Little-endian, signed or unsigned
Output	
Sample Rate	48kHz or 16kHz, monaural
Bit Resolution	16-bit

Control	
RS232	2 ports
GPIO (Core 8 FLEX only)	8x8

Panel Indicators and Controls	
Front Panel LEDs	POWER (blue LED), ID (green LED)
Front Panel Control	ID button (momentary)
Rear Panel Indicators	LAN A, LAN B: Link, Speed, Activity (multi-color LEDs)

Physical	
Product Dimensions (L x W x H)	11.28 x 8.66 x 1.72 in (286.6 x 220.0 x 43.6 mm)
Product Weight	4.0 lbs. (1.8kg) Core 8 FLEX, 3.6 lbs. (1.6kg) Core NANO
Shipping Weight (Gross Weight)	6.4 lbs. (2.9kg) Core 8 FLEX, 4.9 lbs. (2.2kg) Core NANO

Environmental	
Power Consumption	40W typical, 60W maximum
Cooling	Active, single variable speed fan
Operating Temperature Range	0°C to +50°C
Storage Temperature Range	-20°C to +70°C
Relative Humidity	5% to 85% RH, non-condensing
BTU, Heat Load	110 BTU/Hr.

Compliance
FCC Part 15B, ICES-003:2016, UL, CAN/CSA 22.2, IEC62368-1, IEC60065, ROHS2, WEEE, CE, EN55032, EN55035, EN61000-3-2, EN61000-3-3, CB report, RCM: AS/NZ S32, NOM, GB8898, GB13837, GB17625.1, SJ/T 1164 (ROHS), SANS 941, LOA, EAC: TR-CU-004, TR-TC-020, BIS, KN32, KN35, KC60065, SASO

Knowledge Base

Find answers to common questions, troubleshooting information, tips, and application notes. Link to support policies and resources, including Q-SYS Help, software and firmware, product documents, and training videos. Create support cases.
support.qsys.com

Customer Support

Refer to the Contact Us page on the Q-SYS website for Technical Support and Customer Care, including their phone numbers and hours of operation. qsys.com/contact-us/

Warranty

For a copy of the QSC Limited Warranty, go to:
qsys.com/support/warranty-statement/