

DSP-IV SERIES

Quick Guide

Before operating the unit, please read this manual thoroughly and retain it for future reference.
The complete GUI user's manual is available on zapco.com/download

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Protect your audio investment by using the correct type of wire for Power and Ground.
See **All Wire is not created equal** on Page 6

The PC Program (GUI) for Control of this DSP

Please download the GUI at www.zapco.com

The GUI does not require installation, simply download the .exe file and put it on your desktop or in a folder. We recommend that you create a folder "Zapco DSP-AT", where you can store the GUI file and also save you tuning presets.

MISSION STATEMENT

Committed to Excellence

ZAPCO is dedicated to the pursuit of audio fidelity. Our prime objectives are to design and manufacture audio products of unsurpassed quality, to provide unparalleled support and service for these products and to conduct business in a manner that will enhance the quality of life for all involved.

Experience (Knowledge from doing)

There is absolutely no substitute for experience; that is a simple fact of life. Another simple fact is that ZAPCO has, for over forty years, been the leader in defining quality standards for the car audio industry.

These years of experience have led to a thorough understanding of the challenges that are unique to the world of car audio. ZAPCO's relentless quest for sonic purity consistently yields imaginative designs that utilize the most innovative technologies. The resulting products set the criteria by which all others in the industry are judged.

The new Zapco DSP-IV Series

Congratulations on your purchase of this new Zapco product. It has been designed and built to give you many years of reliable, industry leading performance and true audiophile level sound quality.

Zapco introduced the world to full function in-car digital processing in 2004 with the Zapco DSP-6 and the Zapco Digital Processing Network. This was the first full function DSP for the car and included a full line of amplifiers with full function digital processing build right in. In 2016 we brought out our fourth generation of processing in the Zapco DSP-Z8 IV. The Z8 IV was a mid-priced unit designed to bring audiophile processing in an affordable package, and it did just that. The Zapco DSP-Z8IV met rave reviews, out performing DSPs costing twice as much, with a straightforward, easy to navigate interface so tuning would be a breeze, and an analog signal to noise of -106dB (-110dB Digital).

The DSP-Z8 IV II series processing took the IV to a whole new level. Sonically the DSP-Z8 IV II has all the qualities of the original IV with an even lower noise floor. For advanced tuning possibilities the IV II had a much-improved GUI with many important upgrades. In addition, for all those who need everything in a very small package, the DSP-Z8 IV II series brought all this great processing to the ADSP-Z8 IV-8, an eight-channel full range Class D amplifier with 80 Watts RMS per channel, at 4 ohms. That put the Z8 IV II processing and an 8-Channel amplifier in a single convenient one-box installation.

Now we present two new Zapco DSP and three integrated DSP/Amplifiers. What's new? New features and new control. The sharp look matching the Black and Copper theme of the AP amplifiers is only the beginning. The new coaxial and optical digital inputs accept the digital signal from your head unit or from a portable HD player. The new units also have a port for HD Bluetooth streaming (with the optional HD-BT II-D module). An interactive digital port will expand your options even more. The port accepts the control input from the included Dash Remote so you can change input source, select your song, control the master volume and even control the output of your system's bass amps. About the GUI, the added Advanced menu also has a Mixing Set (you can make your own configuration with complete control of how much of each input you assign to each processing channel) and an AutoTune function (available only for DSP-Z8 IV AT and ADSP-Z8 IV-6AT models) that gives you automatic Calibration for Equalization, Phase, and Signal Delay, when you add the optional calibrated tuning microphone. Drop-down menus let you assign each channel the correct designation for your system.

Before you start your installation

ZAPCO highly recommends that a fuse or circuit breaker be placed within 18" of the battery. Although you will add a fuse or fuse block near the amplifier it is still a possibility that a pinched power wire between the component fuse and the battery could result in a short, or even a fire. The protection device should be placed where it can be accessed easily and all wiring should be routed safely and correctly according to the following guidelines:

- Do not run wiring close to hot or spinning objects.
- Always use wire grommets when routing wire through the firewall or any other metal panels.
- Make sure that the potential for pinched wiring is avoided by routing all wires away from moving objects, including brake, gas and clutch pedals, etc.

When connecting our amplifiers to pre-wired stock speakers, care must be taken that there are no common connections between left and right speaker wires, i.e. two or more speakers using the same ground connection (very common in pre-85 cars), as this will cause the amplifier to go into immediate protection or may cause damage to the amplifier. Output connections are not common chassis ground. Please follow the hookup instructions in this owner's manual. Any questions should be directed to your local ZAPCO dealer.

Upgrading a Factory Stereo

If you are upgrading a factory stereo, the DSP/Amplifiers have a separate speaker level input plug that senses current, so you do not need to run a turn-on wire. However, auto-on is not useful in all cars as the amplifier can come on in some cars even when the stereo is not on, because of the car's electrical system. The DSP/Amplifiers have a switch that allows you to defeat the auto-on if you do not want to use that function.

All Wire is not created equal

Please do not use CCA wire with Zapco amplifiers

It is easy to think of wire as just wire but the fact is there are major differences between the types of wires being offered today. The price of copper has gone up quite a bit lately, but you will notice that you can still buy heavy primary wire at very reasonable prices. How can this be? Simple... That lower price wire is not all copper, it is CCA wire. CCA stands for Copper Clad, Aluminum. That means it is aluminum wire with a thin coating of copper around the outside of the wire. Does it look like copper wire? Absolutely. But does it conduct electrical current like copper? Absolutely NOT!

If the wire does not say OFC Copper wire or Solid Copper wire do not use it.

Two things can and likely will happen:

- Because CCA wire can not conduct DC electrical current like copper wire can, your amp will not get the current it needs to produce its rated power. That means you get less power and more distortion. It also taxes the amplifier that is trying to make its power, shortening the life of the amp.
- CCA wire corrodes quickly and causes terminals that used to be tight to become loose. This causes arcing when electrons to fly around all the open space lookin for more copper. This causes heat that damages connections and can even eventually melt the terminal blocks on your amplifier.

In short: While CCA wire is excellent for high frequency AC current (like tweeter voice coils), it is absolutely bad for high current 12V DC like power and ground for a car audio amplifier.

We have seen CCA wire become a major cause of amplifier failures as buyers are offered CCA as a low cost alternative to pure copper wire. So always look at the description of the contents of wire that you purchase. When someone offers to save you some money with CCA wire just say "No, thank you". Protect your investment with real copper wire.

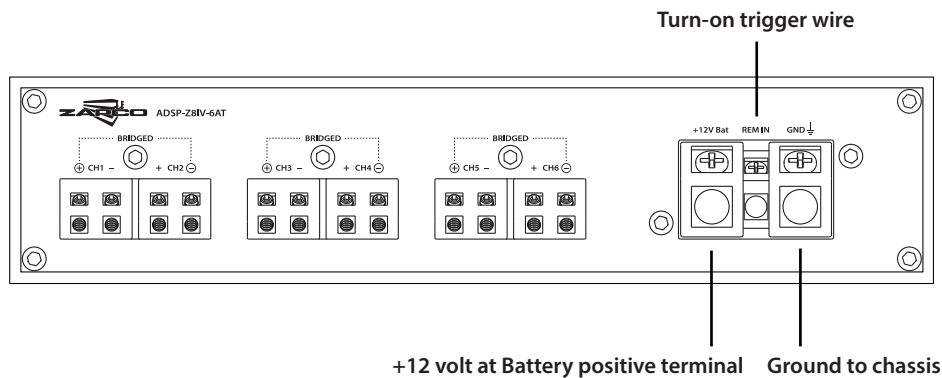
Planning your power connections

The power end plate of the DSP/Amplifiers has the speaker connections, the main 12-volt power input, the 12-volt turn-on wire, and the main Ground connection.

- The 12-volt power input must be connected the vehicle battery's positive (+) terminal, and a main system fuse should be placed close to the battery
- The Ground connection must be securely attached to bare metal at the vehicle frame, or other heavy chassis component with a direct connection to the frame

Note: Seat bolts and seat belt bolts are NOT good ground points

- The small terminal between the main power and ground is the +12 turn-on input and can be connected to the head unit turn-on output wire. If none is available it can be connected to an accessory (ACC) terminal. You should avoid using any ignition-on (IGN) wire, as they can be noisy



Wire Sizing Chart

	Length of Run							
	4 ft	7 ft	10 ft	13 ft	16 ft	19 ft	22 ft	28 ft
0-20 amps	14	12	12	10	10	8	8	8
20-35 amps	12	10	8	8	6	6	6	4
35-50 amps	10	8	8	6	6	4	4	4
50-60 amps	8	8	6	4	4	4	4	2
65-85 amps	6	6	4	4	2	2	2	0
85-105amps	6	6	4	2	2	2	2	0
105-125 amps	4	4	4	2	2	0	0	0
125-150 amps	2	2	2	2	0	0	0	0

Note: The DSP/Amplifiers have terminals that do not require connectors. You simply insert a bare portion of wire and tighten the connection with the supplied Hex tool. As the wire conforms to the connector the connection can loosen. You should re-tighten the connection after about a week.

More words about Power and Ground

The second most common cause of under performing amplifiers is insufficient power current or a poor power connection. The most common cause of under performing amplifiers is insufficient ground current or a bad ground connection.

12-volt current: Battery power works only if it travels in a complete circuit from the battery positive terminal to the battery negative terminal. Main power input, of course, is attached to the battery positive terminal. Ground current is returned to the battery through the chassis to the point where the battery is grounded.

The current available for your amplifier to use to produce power will be restricted by the smallest gauge of wire in the circuit and by the weakest physical connection in the circuit.

Wire Size

It's often surprising how many people will obsess about signal wire but routinely provide the amplifier with only a fraction of the current it needs to do its job. The most common wire gauge used in car audio is 10-gauge, and the most common location for amplifiers is in the trunk. That will only be good for about 100 watts (See the chart next page).

Let's look at a fairly small system. If you use a 50 watt/ch amp (25 amps) for the highs and a 100 watt/ch amp (40 amps) for the woofers, you need at least a 4-gauge and maybe a 2-Gauge wire to provide 65 amps at the trunk. Use the Wire Sizing Chart. Add up the fuse values on the amplifier(s) then choose the proper size wire based on the distance from the car battery to the amplifier location. Always use the same gauge wire for the main ground as you do for the main power. Always make your ground as short as possible and secure it to a clean solid surface, preferably the vehicle frame.

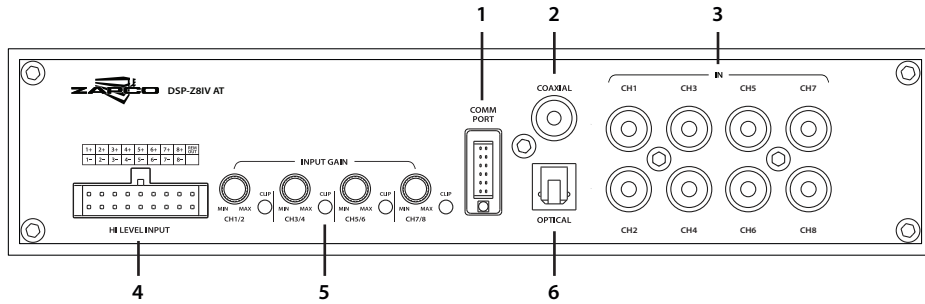
Mounting your DSP/Amplifier

Mounting your Zapco amplifier is easy. Just keep in mind a few guidelines:

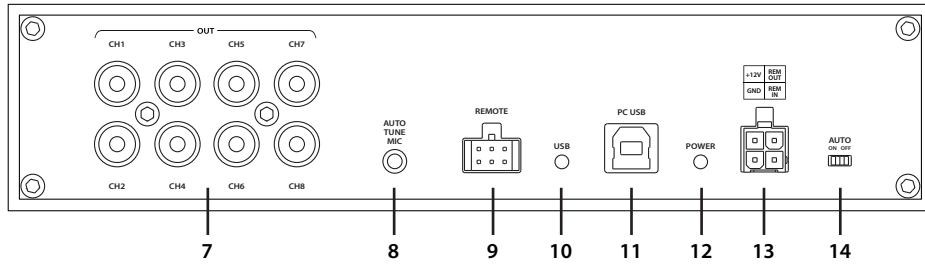
- The amplifier can be mounted in any direction, on wood, metal, or carpet but not upside down as heat rises and will build up if it is mounted upside down
- The metal chassis of the amp can be grounded or left isolated
- The amplifier requires adequate ventilation. Creating power creates heat, and cooling requires air. Position the amplifier with sufficient surrounding area for air supply and keep the end plates clear for future access
- Keep the amplifier out of the engine compartment or other locations that may cause excessive heat or moisture
- Do not mount the amplifier to a subwoofer box or other place that may have excessive vibration

Setting Gains: Input gain pots should be set so that when playing the loudest music you will play, the clip lights just barely start to flash, but never stay on. If the clip lights stay on more than just a bare fraction of a second then you will have audible distortion on the input stage, and distorted signal at the input will absolutely mean distorted sound at the output.

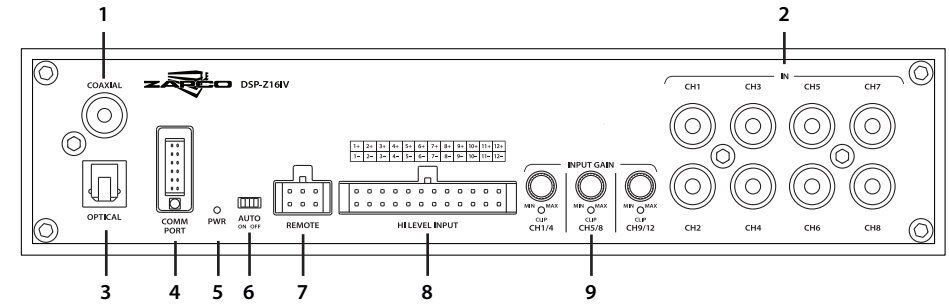
DSP-Z8 IV AT Panels



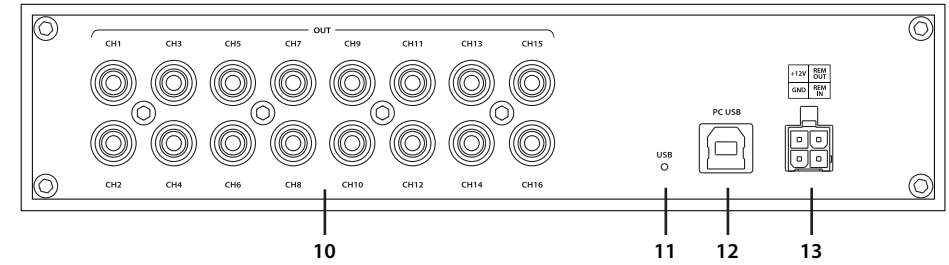
- 1. Comm Port for HD-BT module
- 2. Coaxial digital input
- 3. 8-Channel RCA inputs
- 4. Speaker level input plug for OEM hookup
- 5. Variable gain controls with clip indicators
- 6. Optical digital input
- 7. 8-Channel RCA outputs
- 8. Microphone Input for Auto-Tuning
- 9. Dash remote port
- 10. USB LED
- 11. USB connector for PC control
- 12. Power-On LED
- 13. Power/Rem/Gnd connector
- 14. Auto-on switch for OEM integration



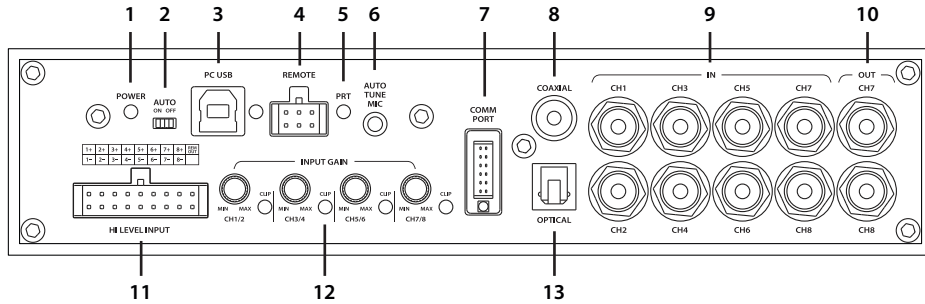
DSP-Z16 IV Panels



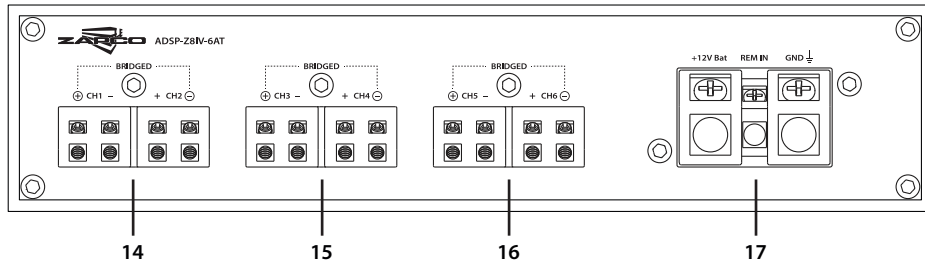
- 1. Coaxial digital input
- 2. 8-Channel RCA inputs
- 3. Optical digital input
- 4. Comm Port for HD-BT module
- 5. Power-On LED
- 6. Auto-on switch for OEM integration
- 7. Dash remote port
- 8. Speaker level input plug for OEM hookup
- 9. Variable gain controls with clip indicators
- 10. 16-Channel RCA outputs
- 11. USB LED
- 12. USB connector for PC control
- 13. Power/Rem/Gnd connector



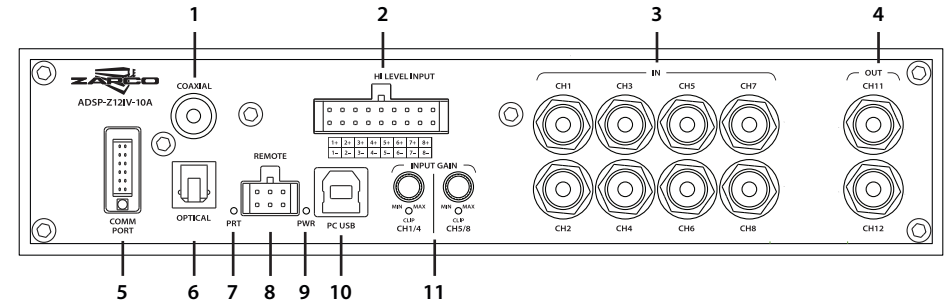
ADSP-Z8 IV-6AT Panels



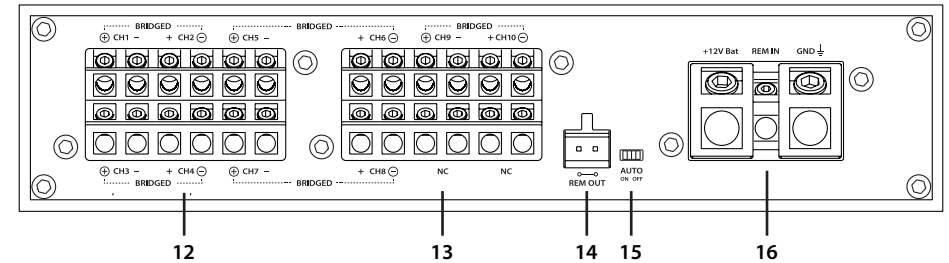
1. Power-On LED
2. Auto-on switch for OEM integration
3. USB connector for PC control
4. Dash remote port
5. Protection LED
6. Microphone Input for Auto-Tuning
7. Comm Port for HD-BT module
8. Coaxial digital input
9. 8-Channel RCA inputs
10. 2-Channel RCA outputs
11. Speaker level input plug for OEM hookup
12. Variable gain controls with clip indicators
13. Optical digital input
14. Speaker output connectors for Ch 1~2
15. Speaker output connectors for Ch 3~4
16. Speaker output connectors for Ch 5~6
17. Power/Rem/Gnd terminals



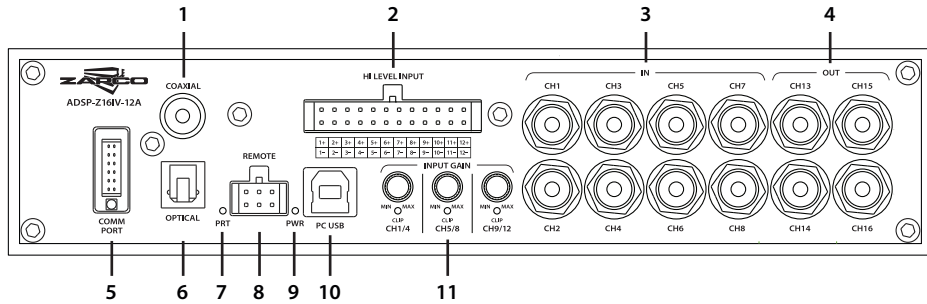
ADSP-Z12 IV-10A Panels



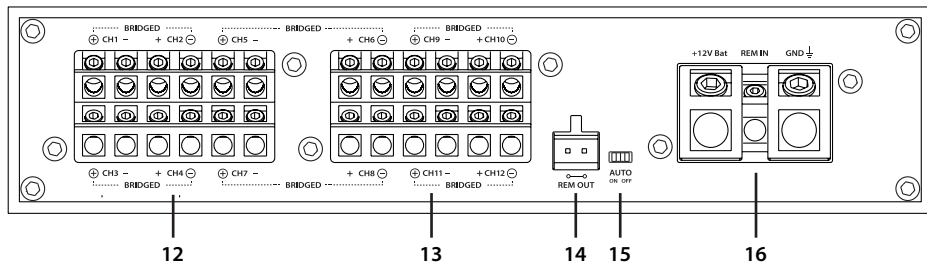
1. Coaxial digital input
2. Speaker level input plug for OEM hookup
3. 8-Channel RCA inputs
4. 2-Channel RCA outputs
5. Comm Port for HD-BT module
6. Optical digital input
7. Protection LED
8. Dash remote port
9. Power LED
10. USB connector for PC control
11. Variable gain controls with clip indicators
12. Speaker output connectors for Ch 1, 2, 3, 4, 5, 7
13. Speaker output connectors for Ch 6, 8, 9, 10
14. Remote Out
15. Auto Turn-On
16. Power/Rem/Gnd terminals



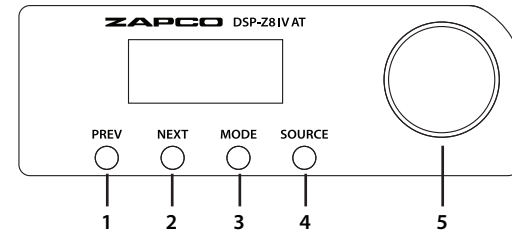
ADSP-Z16 IV-12A Panels



1. Coaxial digital input
2. Speaker level input plug for OEM hookup
3. 8-Channel RCA inputs
4. 4-Channel RCA outputs
5. Comm Port for HD-BT module
6. Optical digital input
7. Protection LED
8. Dash remote port
9. Power LED
10. USB connector for PC control
11. Variable gain controls with clip indicators
12. Speaker output connectors for Ch 1, 2, 3, 4, 5, 7
13. Speaker output connectors for Ch 6, 8, 9, 10, 11, 12
14. Remote Out
15. Auto Turn-On
16. Power/Rem/Gnd terminals



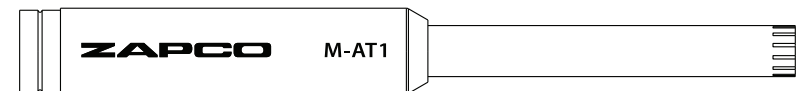
Remote Control



1. Switch to the previous song (Bluetooth)
2. Switch to the next song (Bluetooth)
3. Mode switching
4. Source switching
5. Volume knob. Long press for 5 seconds enter the switching mode between main volume or subwoofer. Short press the mute

The Microphone for Auto Tuning (optional for DSP-Z8 IV AT and ADSP-Z8 IV-6AT)

The M-AT1 is a special microphone for setting up the sound automatically, based on the response characteristics of the speakers and auto detail detection of the car. After detecting all the necessary information, the audio information screen will be transmitted to the computer.



1. Connect the microphone to the dedicated port of the unit.
2. The microphone must be fixed on the headrest of the driving position. This position is basically the same as the head of the driver.

The Graphical User Interface (GUI)

The new Zapco Series IV AT GUI gives you all the great sound and functionality of the Series IV II and it adds Coaxial digital input as well as Optical digital and Bluetooth streaming. Drop-down menus also let you name each output channel to match your system setup. The added Advanced menu also has a Mixing Set and an AutoTune function (only for DSP-Z8 IV AT and ADSP-Z8 IV-6AT units), when you add the optional calibrated tuning microphone.

Please see the full manual at www.zapco.com for a full description of the program, including the Mixing Set and Auto Calibration in the Advanced menu.



DSP Technical Specifications

	DSP-Z8 IV AT	DSP-Z16 IV
Type	8-Ch. DSP	16-Ch. DSP
DSP Processor	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
AD Signal Converter	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
DA Signal Converter	Cirrus Logic CS8422 24-bit/192 KHz, 140 dB DR THD+N -120 dB	Cirrus Logic CS8422 24-bit/192 KHz, 140 dB DR THD+N -120 dB
Hi-Level Speaker Inputs	8 Ch., 2-20 V	12 Ch., 2-20 V
RCA Inputs	8 Ch., 1-5 V RMS	8 Ch., 1-5 V RMS
RCA Outputs	8 Ch., 1-5 V RMS	16 Ch., 1-5 V RMS
Optical Digital Input	24-bit/192 KHz	24-bit/192 KHz
Coaxial Digital Input	32-bit/192 KHz	32-bit/192 KHz
Signal Stage	Freq. Response: 10 Hz - 22.5 KHz S/N In: 110 dBA (D), 106 dBA (A) THD+N In: 0,002% (D), 0,005% (A) - Crosstalk (1 KHz): 90 dB -	Freq. Response: 10 Hz - 22.5 KHz S/N In: 110 dBA (D), 106 dBA (A) THD+N In: 0,002% (D), 0,005% (A) - Crosstalk (1 KHz): 90 dB -
Equalizer	Graphic / Parametric 31-Bands	Graphic / Parametric 31-Bands
Delay/Polarity	Range 0/15 ms, Step 0.02 ms Max 515 cm, Step 0.68 cm Polarity 0-180°	Range 0/15 ms, Step 0.02 ms Max 515 cm, Step 0.68 cm Polarity 0-180°
Mute/Solo	Yes, each channel	Yes, each channel
Crossover Type	Linkw., Butterw., Bessel, Tsecheb.	Linkw., Butterw., Bessel, Tsecheb.
RMS Power	-	-
PC Connection	USB 2.0	USB 2.0
BT Streaming	aptX HD (optinal ext. module)	aptX HD (optinal ext. module)
Remote Control	1" LCD Prev/Next/Mode/Source/Vol	1" LCD Prev/Next/Mode/Source/Vol
Size (mm)	213 (W) x 113 (L) x 50 (H)	213 (W) x N/A (L) x 50 (H)

DSP/Amps Technical Specifications

	ADSP-Z8 IV-6AT	ADSP-Z12 IV-10A
Type	8-Ch. DSP + 6 Ch. Amp.	12-Ch. DSP + 10 Ch. Amp.
DSP Processor	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
AD Signal Converter	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
DA Signal Converter	Cirrus Logic CS8422 24-bit/192 KHz, 140 dB DR THD+N -120 dB	Cirrus Logic CS8422 24-bit/192 KHz, 140 dB DR THD+N -120 dB
Hi-Level Speaker Inputs	8 Ch., 2-20 V	8 Ch., 2-20 V
RCA Inputs	8 Ch., 1-5 V RMS	8 Ch., 1-5 V RMS
RCA Outputs	2 Ch., 1-5 V RMS	2 Ch., 1-5 V RMS
Optical Digital Input	24-bit/192 KHz	24-bit/192 KHz
Coaxial Digital Input	32-bit/192 KHz	32-bit/192 KHz
Signal Stage	Freq. Response: 10 Hz - 22.5 KHz S/N In: 110 dBA (D)106 dBA (A) THD+N In: 0,002% (D), 0,005% (A) THD+N Analog In: 0,07% (DSP+Amp) Crosstalk (1 KHz): 90 dB Crosstalk: 45 dB (DSP+Amp)	Freq. Response: 10 Hz - 22.5 KHz S/N In: 110 dBA (D)106 dBA (A) THD+N In: 0,002% (D), 0,005% (A) THD+N Analog In: 0,07% (DSP+Amp) Crosstalk (1 KHz): 90 dB Crosstalk: 45 dB (DSP+Amp)
Equalizer	Graphic / Parametric 31-Bands	Graphic / Parametric 31-Bands
Delay/Polarity	Range 0/15 ms, Step 0.02 ms Max 515 cm, Step 0.68 cm Polarity 0-180°	Range 0/15 ms, Step 0.02 ms Max 515 cm, Step 0.68 cm Polarity 0-180°
Mute/Solo	Yes, each channel	Yes, each channel
Crossover Type	Linkw., Butterw., Bessel, Tsecheb.	Linkw., Butterw., Bessel, Tsecheb.
RMS Power	6 x 80 (4Ω), 6 x 120 (2Ω) 3 x 240 Watt (4Ω/Bridged)	10 x 80 (4Ω), 10 x 120 (2Ω) 5 x 240 Watt (4Ω/Bridged)
PC Connection	USB 2.0	USB 2.0
BT Streaming	aptX HD (optinal ext. module)	aptX HD (optinal ext. module)
Remote Control	1"LCD Prev/Next/Mode/Source/Vol	1"LCD Prev/Next/Mode/Source/Vol
Size (mm)	213 (W) x 222 (L) x 50 (H)	213 (W) x 291 (L) x 50 (H)

	ADSP-Z16 IV-12A
Type	16-Ch. DSP + 12 Ch. Amp.
DSP Processor	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
AD Signal Converter	Cirrus Logic CS47048 32-bit/192 KHz, 108 dB DR THD+N -98 dB
DA Signal Converter	Cirrus Logic CS8422 24-bit/192 KHz, 140 dB DR THD+N -120 dB
Hi-Level Speaker Inputs	12 Ch., 2-20 V
RCA Inputs	8 Ch., 1-5 V RMS
RCA Outputs	4 Ch., 1-5 V RMS
Optical Digital Input	24-bit/192 KHz
Coaxial Digital Input	32-bit/192 KHz
Signal Stage	Freq. Response: 10 Hz - 22.5 KHz S/N In: 110 dBA (D)106 dBA (A) THD+N In: 0,002% (D), 0,005% (A) THD+N Analog In: 0,07% (DSP+Amp) Crosstalk (1 KHz): 90 dB Crosstalk: 45 dB (DSP+Amp)
Equalizer	Graphic / Parametric 31-Bands
Delay/Polarity	Range 0/15 ms, Step 0.02 ms Max 515 cm, Step 0.68 cm Polarity 0-180°
Mute/Solo	Yes, each channel
Crossover Type	Linkw., Butterw., Bessel, Tsecheb.
RMS Power	12 x 80 (4Ω), 12 x 120 (2Ω) 6 x 240 Watt (4Ω/Bridged)
PC Connection	USB 2.0
BT Streaming	aptX HD (optinal ext. module)
Remote Control	1"LCD Prev/Next/Mode/Source/Vol
Size (mm)	213 (W) x 291 (L) x 50 (H)

Software/PC requirements:
Microsoft Windows (32/64bit): XP, Vista, Windows 7, Windows 8, Windows 10. Continuous exposure to excessive sound pressure levels may cause permanent hearing loss. ZAPCO strongly advises that you use common sense when setting volume levels. Everything written in this manual is for the proper use of the products. Some features or specifications could be modified during production to improve the product performance. The technical specifications and functionalities stated here are current as of the time of publication. General instructions and safety warnings are intended in any case to be always effective for this type of product. The latest manual with any updates is always available at:
www.zapco.com/download



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