PCX1616

Digital Audio Matrix

Operating Manual

CAUTION

PLEASE READ THESE SAFETY MATTERS CAREFULLY BEFORE USE:

- This product must make sure connect to the ground correctly. If it has broken down, to avoid any electric shock, the device power cord and plug both equipped safety ground connection. The power cord should according to the requirement to install and ground connection.
  Warning: Incorrect ground connection might be caused electric shock happen!
  If you have any inquiry about the ground connection, please let qualified people checking it or fix it, do not change it by yourself. If the power plug is unsuitable, you can entrust electrician or professional staff to install the suitable power plug.
- To avoid the risk of injury, please close supervision when using the product near child.
- Please do not use the device at wet place, such as: near bathtub, washbasin, kitchen sink, wet basement or near swim ming pool and lake.
- It should not be placed near the device which filled with liquids such as the vase.
- This product should install at draughty place or dry environment.
- The power source type must be match to the operation instruction or the volts type which on the product.
- The product must keep away from heat source, such as: electric heater, electric blanket or other heat source products.
- The product equipped one power cord that complied with safety certification. If you can't insert the power cord into the plug, please contact electrician or professional staff to change the old plug. Attention that should not break the power plug safety device.
- If the product not for operation for a long time. Please pull out the power cord from power plug. Don't drag the power cord
- This product use coupler as a make and break device, should be maintained convenient operation
- Please don't operate the product when following things opened, should call qualified people checking it or fix it:
  A.Power cord damaged.
  B.Objects or liquid get into the product.
  C.The product is sopping with rain.
  D.The product can not operate correctly or show obvious unusual.
  E.The product dropped down, damaged.
- Any inquiries about the product which not mentioned in the user manuals, please contact the eligible electrician or professional staff to repair.

- **Only apply to security use which area below altitude of 2000m.**

- **Only apply to security use which condition except tropical climate.**

Pay attention to the dangerous voltage of the insulation within the products. It may be considerable damage to human body.

Important Notices and Operation Instructions.

WARNING:

Please do not let the heavy extrusion or stamp on the power cord, avoid by all pull or distort the power cord.

To avoid the risk of fire or electric shock, please do not use unqualified power cord.

ENGLISH

PCX1616

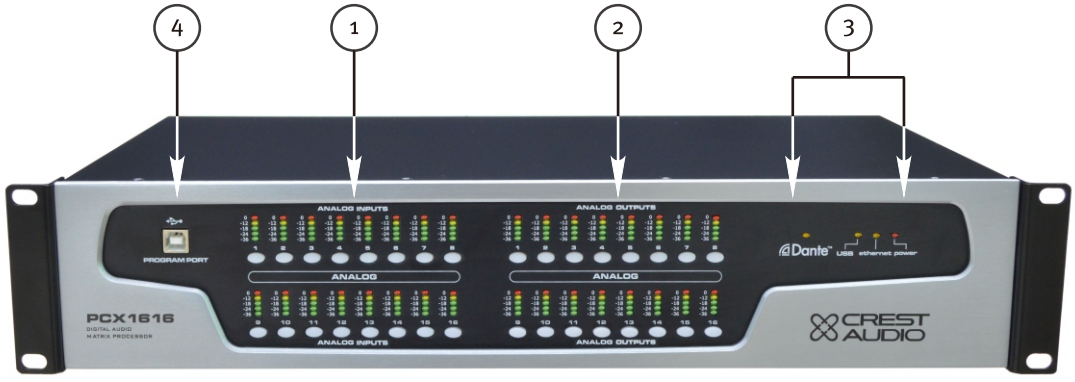
Digital Audio Matrix Processor

Features

- 32 bit SHARC DSP, 96kHz sampling rate, 24 bit AD/DA convert.
- 33x32 channels whole sound mixing matrix design, including 16 local analog input channels, 16 local analog output channels, 32 Dante network input channels and 32 Dante network output channels, and1 internal sound mixing channel.
- Fully supports scalable DANTE digital network audio card , the users can freely configure and choose according to their requirements.
- Dante digital network audio card configuration is a double standard network interface, which fully supports the function of unite switching and hot backup, hardware system can distinguish automatically, can use immediately when it inserts. Software internal and local analog signal can realize fully sound mixing matrix processing. Each channel has independent DSP processing function.
- AUTOMIX channel has powerful mixing function, such as threshold, level, attack time, release time continually adjustment， and level 4 feedback control anti-noise function.
- Each analog input channels with +48V phantom power, MIC/LINK input gain switchable, MIC input sensitivity adjustable.
- Input including low cut, PEQ, noise gate, gain, mute, phase, linkage adjustment and volume adjustment.
- Output including X-over, PEQ, Gain, mute, compressor/limiter, phase, delay, linkage adjustment and volume adjustment.
- Front panel has level indicator for input/output, mute key, USB port, standard Ethernet remote control RJ45 port and RS232&485 at rear panel. IP and ID address can set, network and unite management can realize maximal 255 units link control, but also has remote visit password protected function, make the system more stable and safe.
- Design has thorough control code, fully support the third-party centre control and management, including all volume control, preset scene recall, parameter inquire and return code, current level return display, every input and output channels control. Etc.
- 12 user presets can be save and recall, system work in power-off memory status, ensure the date would not lose.

NOTE: The PCX1616 processors can be setup and operated from the PCX1616 Editor running on a PC. The PC can be connected to the PCX1616 via USB or Ethernet.

Front Panel



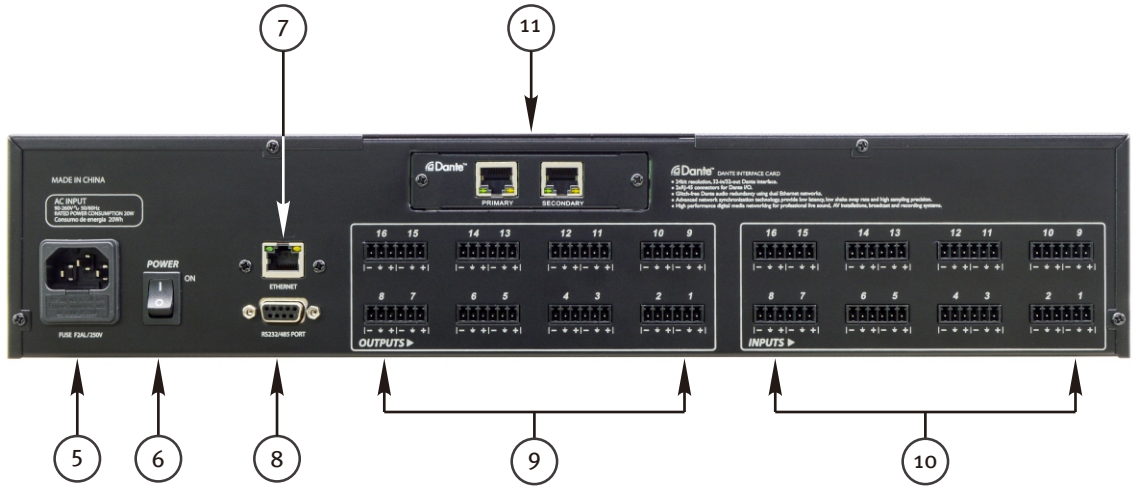
(1) **Analog input channel level indicators and mute key**
5 segment high precision level indicate lights show the current input channel level status, and panel mute key operation.

(2) **Analog output channel level indicators and mute key**
5 segment high precision level indicate lights show the current output channel level status, and panel mute key operation.

(3) **Working status**
Dante indicator light, When USB and internet port online, the signal indicator will light. And turn on the power, indicator light.

(4) **Usb interface**
Used to connect with PC and center-control equipment, to debugging and using.

Rear Panel



(5) **Power socket**
90-260V~50/60Hz.

(6) **Power switch**
This rocker switch supplies ac power to the unit when switched to the on position. The on position is with the top side of the switch pushed "in" or nearly flush with the rear panel.

(7) **Ethernet connection and controlling port**
Setting IP addresses to remote control by CAT-5 cable or WIFI control, also support internet control for long-distance application.

(8) **RS232/485**
Realize remote real-time control of center-control device through RS232, or control by one USB cord, link control by RS485.

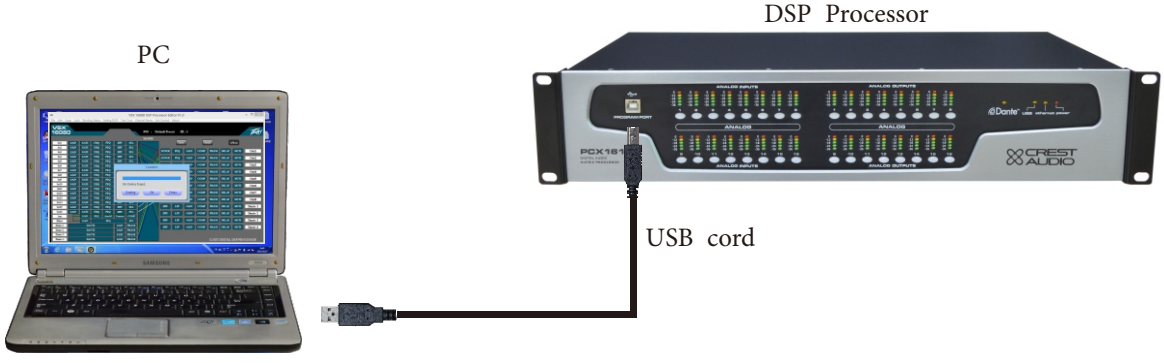
(9) **Signal output ch1~ch16**

(10) **Signal input ch1~ch16**

(11) **Dante card(additionally choose to equip)**
When insert Dante card, it can automatic identification, and panel indicator will light up. The program also can display the 32 in/32 out Dante function interface automatically.

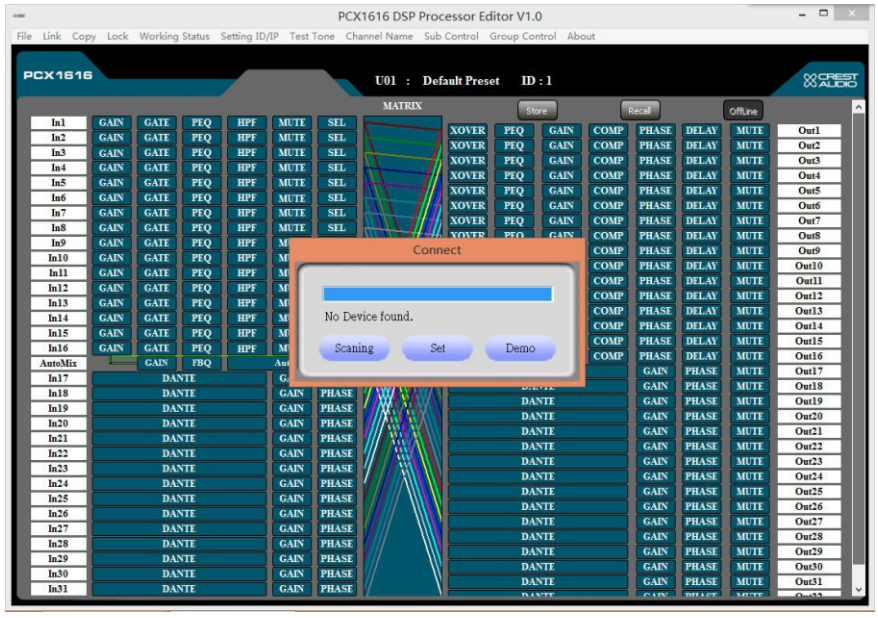
PC software

NOTICE: User manual, PC software are on the attached CD, due to the software upgrades time by time, please do control your DSP processor ONLY by this CD!



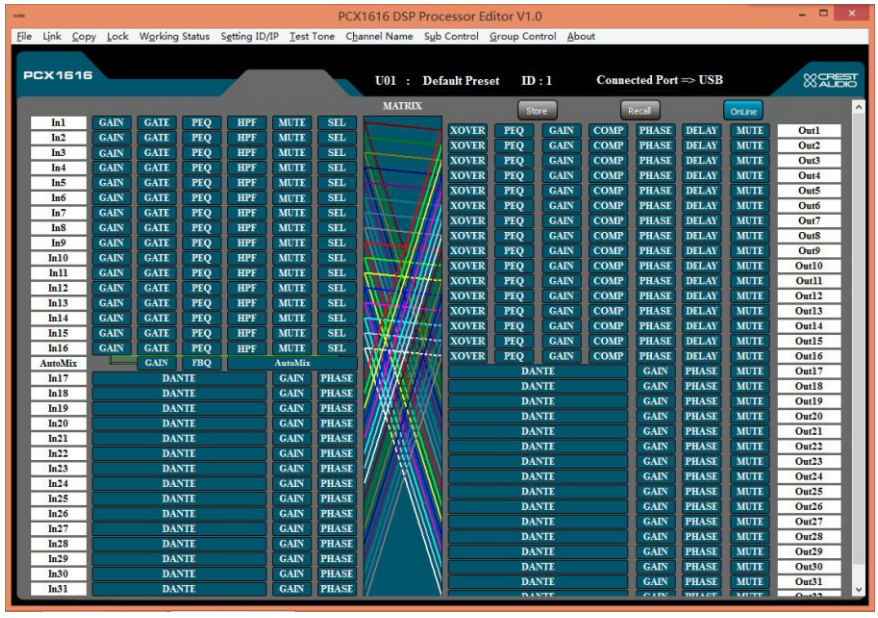
USB CONNECTION STEPS

1. Click the PC software on the CD, press next step to continue according to the instruction until finish setup, then exit.



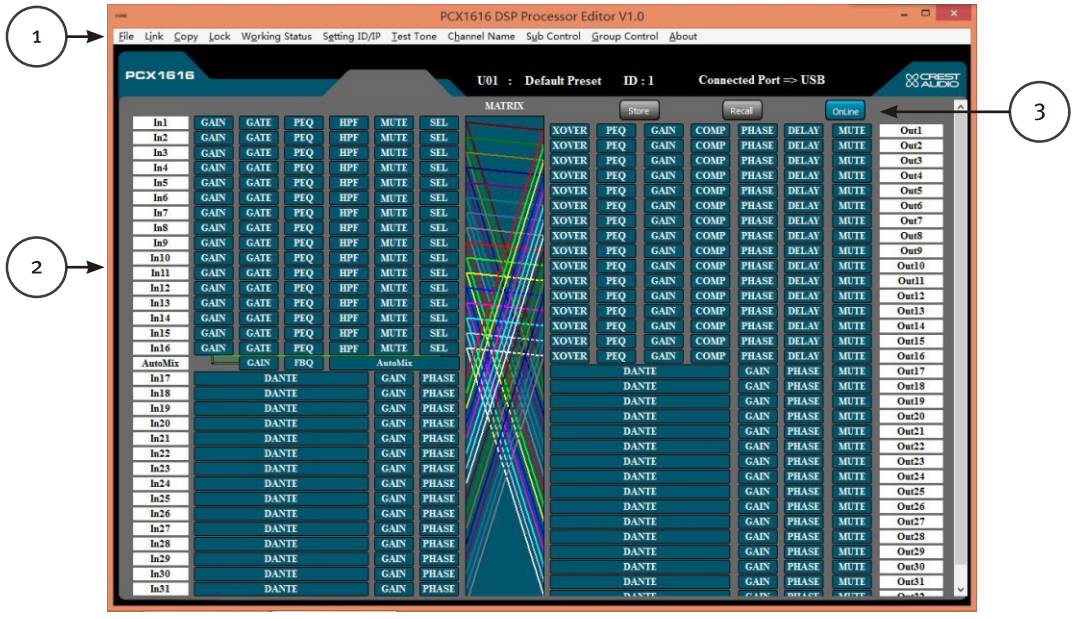
2. Connect the processor to the computer by USB, after power on the device, the computer will searching new hardware automatically, then it will show the message: hardware setup success and can be used.

3. Open PC controlling software, PC software will find USB and connection device, after this the on-line key change into green at the top right corner and show ” Online ” , you can operate the processor by controlling software, Click ”Online” button before exit.



Pc software specifications

(1). **Block diagram interface**

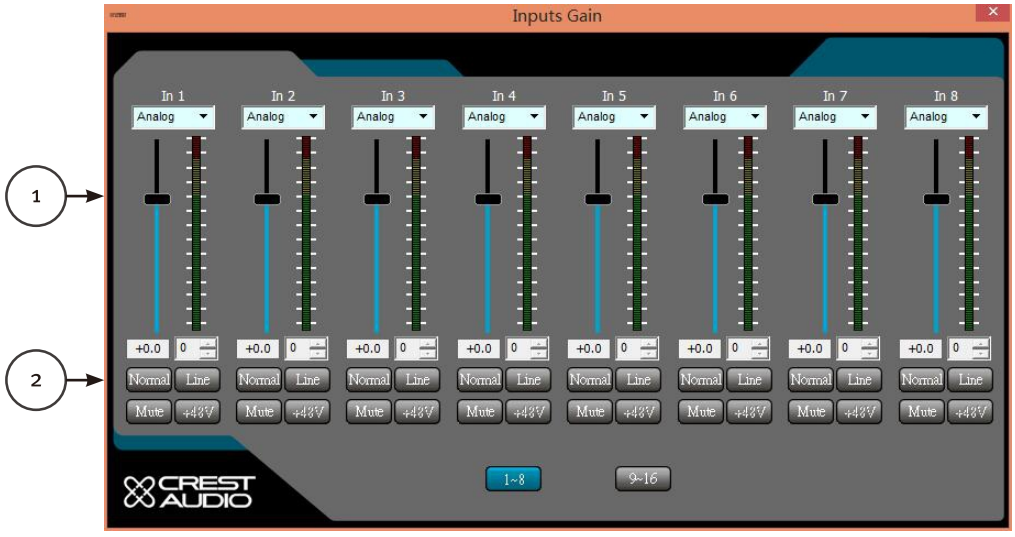


1. Menu

File	Open and save preset parameter, the whole date upload to the computer and download to the device.
Link	Input and output channels can be set freely to adjust all of the parameters .
Copy	Parameter copy freely between the input and Output channels.
Lock	Setting password of the panel to ensure the safety of the device.
Working Status	The working atatus could be set as; not memory ; immediate memory (under U01-12 user mode) , not memory but can be back to U01 mode when power on.
Setting ID/IP	To cascade control more than 254 device by setting different ID Setting IP address for Long-distance and wireless WIFI control.
Test Tone	Buid−in signal generator, outputting pink noise, white noise and sine wave.
Channel Name	The whole channel name are revisable.
Sub Control	Any channel volume are revisable.
Group Control	Independent input and output 4 control group manager, different areas can be controlled by the front panel
About	Display the information about software version and date.

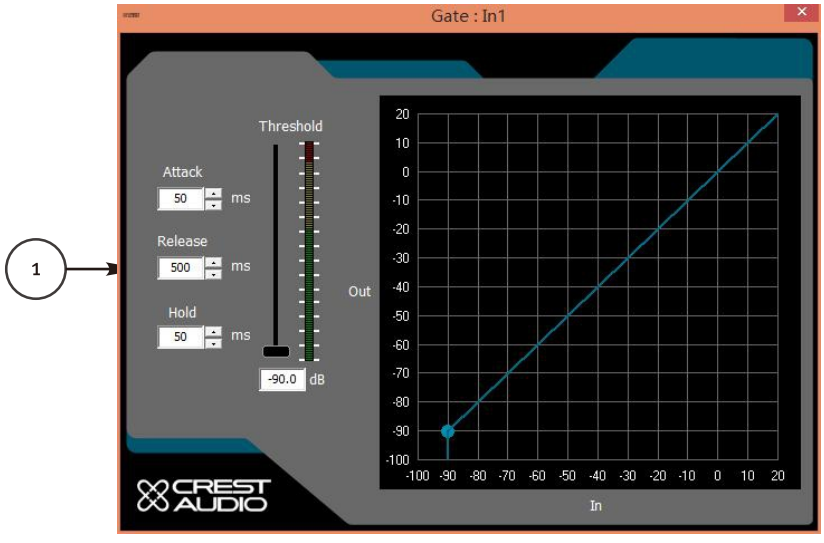
2. Block diagram: Visual display the device electrical connection diagram, click any function can enter the current interface to parameter adjustment, all input and output channel name also can be edited.
3. Preset and link: Used for save and adjust preset parameter, and the link key operation.

(2). **Input volume interface**



1. Can control all channel volume, and all input channel level display.
2. Input MIC and LINE mode switch, MIC gain adjustable independently, +48V phantom power control, and each channel phase and mute parameters.

(3). **Noise gate interface**

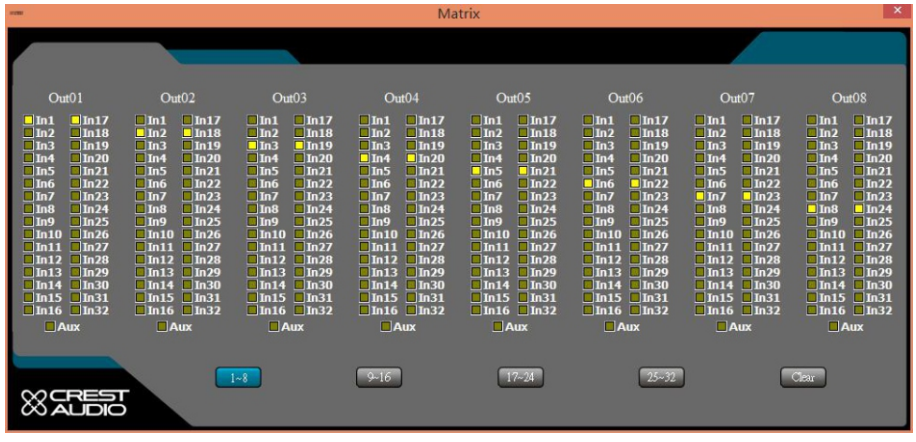


1. Can set input channel noise gate parameter: threshold level is -90dB—0dB, attach time is 1-999ms, release time is 10-3000ms adjustable, save time is 1-999ms, and display noise gate threshold level curve picture and current channel level indicator light.

(4). **Input PEQ interface**

1. All PEQ gain, Q, frequency and type can be adjustment, and bypass key select. PEQ type select with: PEAK, H-SHELF, L-SHELF, LOW CUT, HIGHT CUT, ALLPASS 180°, ALLPASS 360 °adjust.
2. Chose MAG interface, can adjust input channel PEQ and L/H cut curve. Chose PHASE interface, can adjust current channel phase curve.
3. Low cut frequency is 20Hz-20KHz can be adjusted, slop can be select by Butterworth, Bessel, the range is -6dB---24dB adjustable.

(5). **Matrix interface**

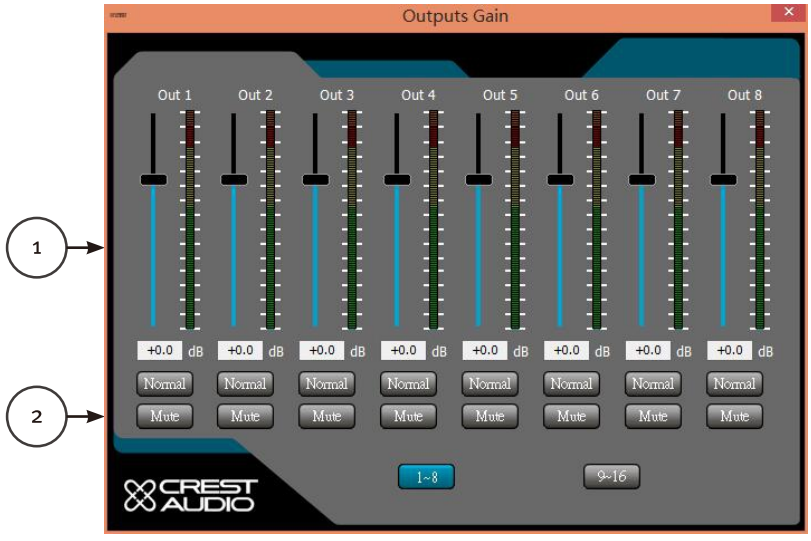


Can select all input channel to output channel's any route option, including AUX, DANTE channel, all mixing gain through the route to output channel can be preset independently, and one key eliminates routing function key.

(6). **Out PEQ interface**

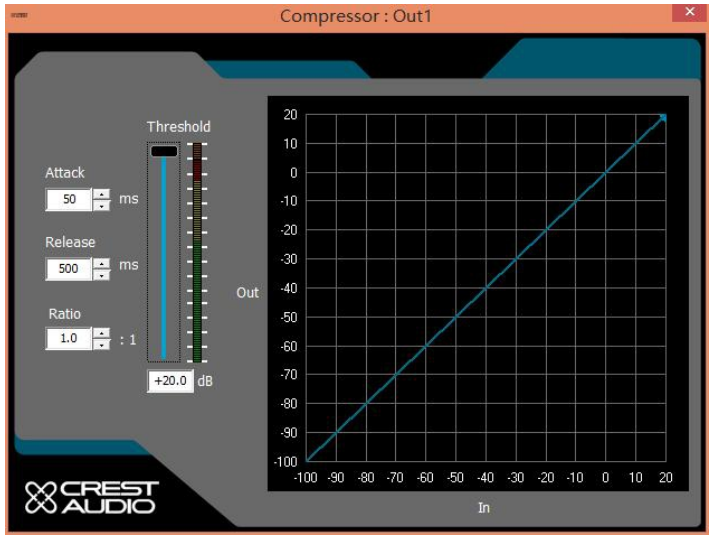
1. All PEQ gain, Q, frequency, type can be adjustment, and bypass key chosen. PEQ type select with: PEAK, H-SHELF, L-SHELF, LOW CUT, HIGHT CUT, ALLPASS 180°, ALLPASS 360 °adjust.
2. Chose MAG interface, can adjust output channel PEQ and L/H cut curve. Chose PHASE interface, can adjust current channel phase curve.
3. Low cut frequency is 20Hz-20KHz can be adjusted, slop can be select by Butterworth, Bessel, Linkwitz-Riley, the range is -6dB–-24dB adjustable.
4. High cut frequency is 20Hz-20KHz can be adjusted, slop can be select by Butterworth, Bessel, Linkwitz-Riley, the range is -6dB–-24dB adjustable.

(7). **Output volume interface**



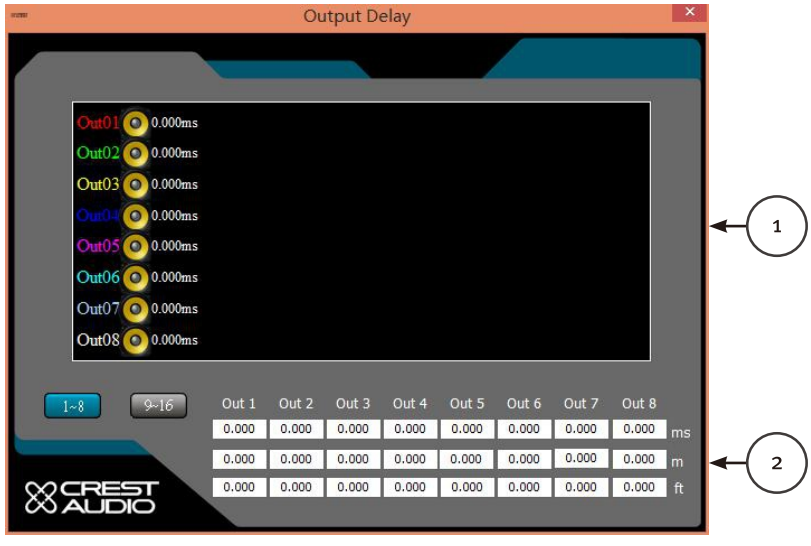
1. Can control all output channel volume, and all output channel level display.
2. All output channel phase and mute adjustable independently.

(8). **Output compressor interface**



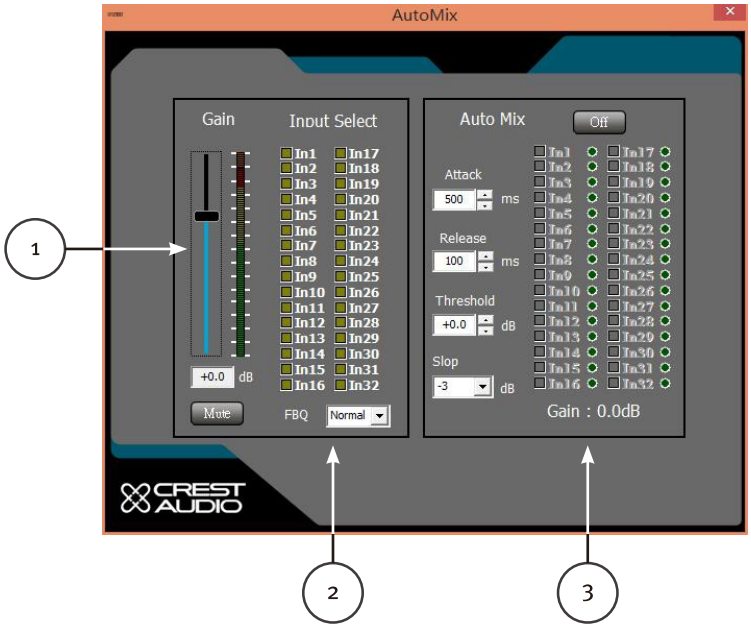
Can preset output channel compressor parameter: compress value is -60dB--+20dB, rate is 1:1、1： 10, LIMIT, attach time is 1-999ms, recovery time is 1-999ms adjustable. And display compress status curve, level status indicator light, compressor status indicator light.

(9). **Delay interface**



1. Visual display all output channels delay parameter status picture.
2. Can adjust all channel delay parameters, the range is 0-680ms, with ms, m, in synchronous display.

(10). **AUTO MIX channel interface**

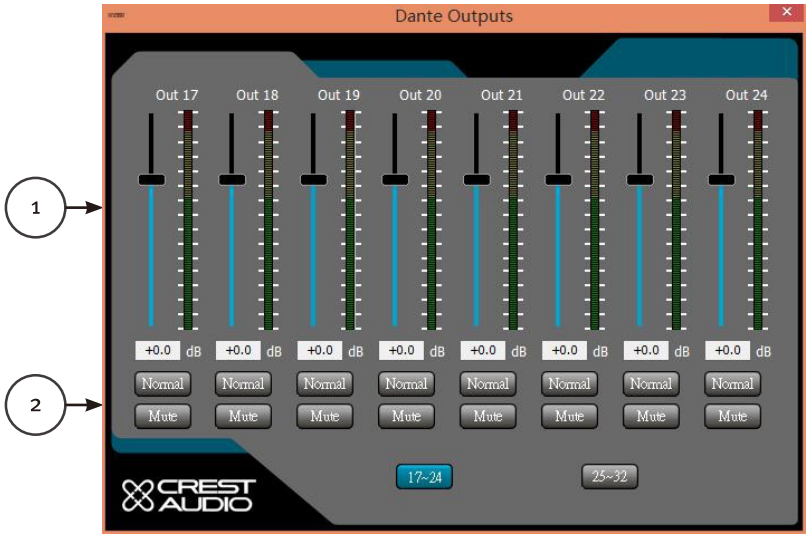


1. AUTO MIX channel gain control pushrod, mute key and level indicate light. Input select key can input 1-16 channels mix in AUTO MIX channel.
2. Automatic feedback control can be set to 1-4 to achieve anti-noise function.
3. Automatic sound mixing ON/OFF, select into automatic sound mixing input channel (note that only selected into AUX channel's input channel, it can enter automatic sound mixing channel), then set the suitable threshold level (-50-0dB), attach time is 0-5000ms, release time is 0-5000ms, when two or more channels signal over the threshold level, these channels will enter automatic sound mixing status. And AUX channel volume will attenuation when the channel quantity increased, the attenuation range is -3dB---6dB.

(11). **Dante input interface**

1. Can control all volume and level display of Dante input channel.
2. All phase and mute can be adjusted independently of Dante input channel.

(12). **Dante output interface**



1. Can control all volume and level display of Dante output channel.
2. All phase and mute can be adjusted independently of Dante output channel.

Specifications

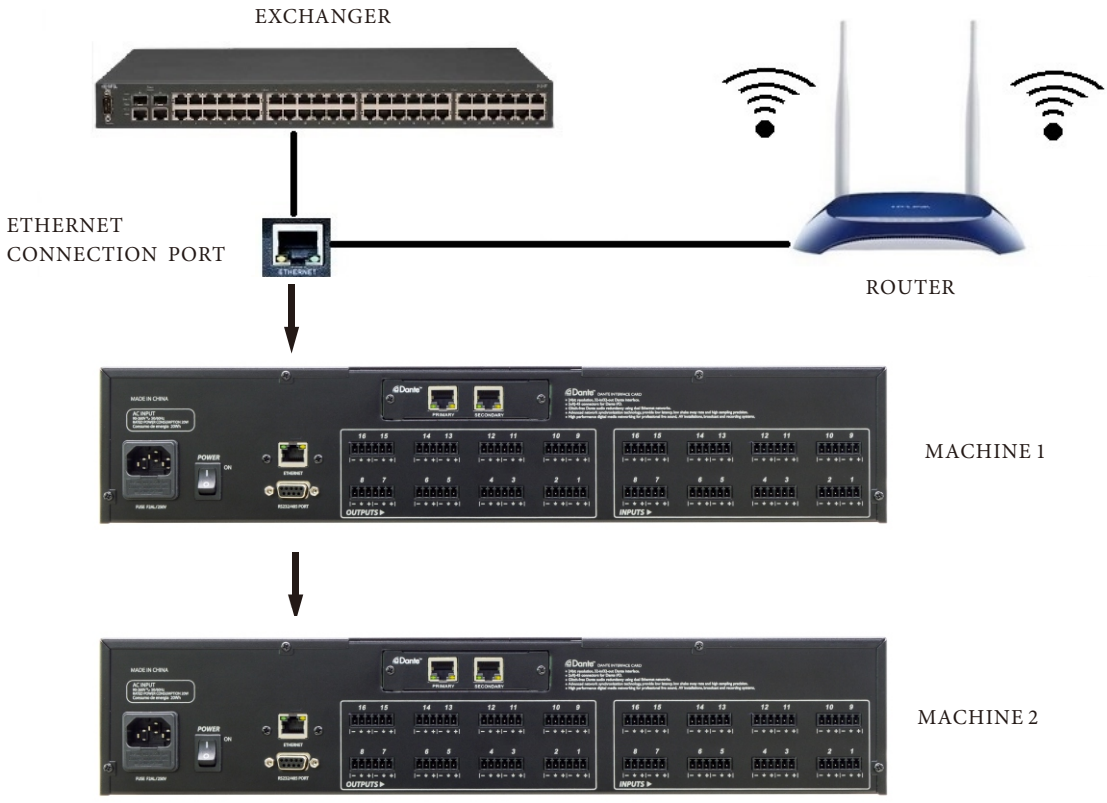
SPEC	Frequency Response	20Hz-20kHz,-0.3dB
	Dynamic range	110dBu
	THD	<0. 005% at 1kHz(0dBu)
	Crosstalk	>70dBu，20Hz-20kHz
	C.M.R.R	>75dBu 1KHz
MIC input	Type	Balance
	Phantom power	+48V DC
	Gain	50dBu
	Impedance	2kΩ
Music input	Type	Balance
	Max input level	+15dBu
	Impedance	>10kΩ
Output	Type	Balance
	Max output level	+15dBu
	Impedance	>500Ω
Digital processing	24bit sigma-delta A/D、D/A	
	32 bit DSP, 96kHz	
AC POWER	90-260V~50/60Hz	
Size(L,W,H)	482*253*88MM	
Weight	4.5KG	

Accessories

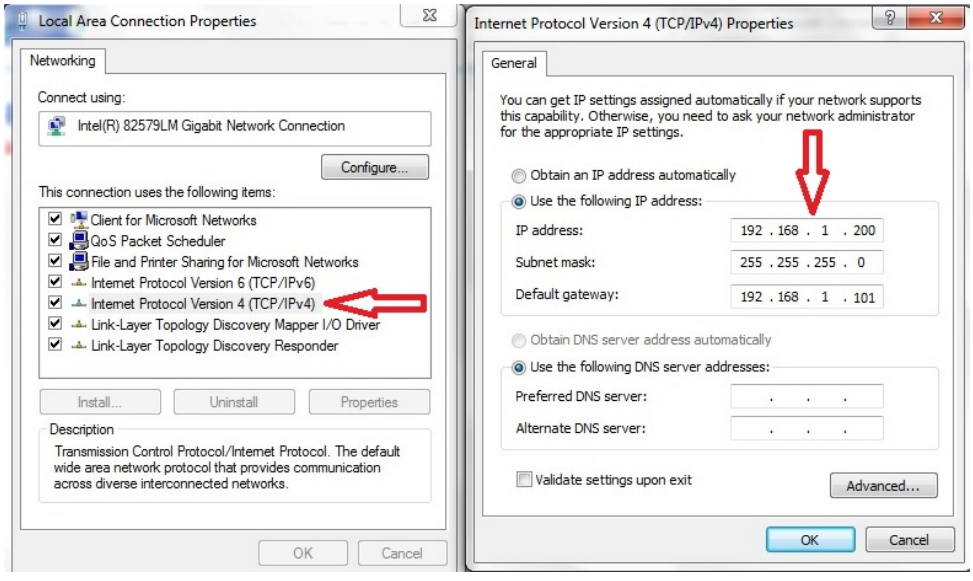
1. CD (Include PC software and user’s manual).
2. One USB cord.
3. One Power cord.

Rear panel control port connection

1. Ethernet connection port:you can choose to connect the computer by wire, connect several devices by switch, or use WIFI by router to control, but need to set different IP address and ID code for each device, otherwise, it might be can't connect successfully due to the IP addresses conflict.



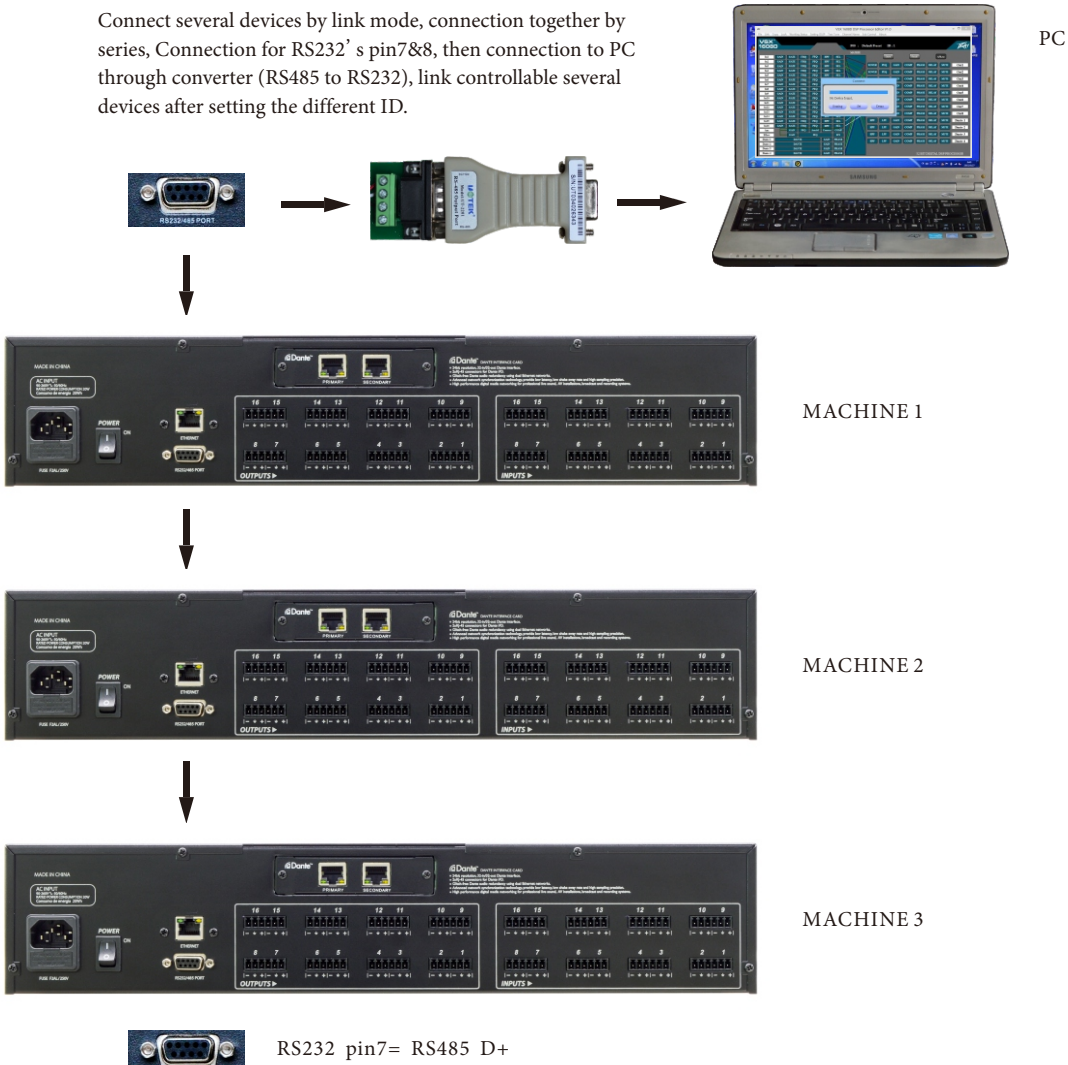
ATTENTION: When using the network port to connect PC software, it need to set the IP address same as the machine's default IP (192.168.1.101), as the following chart:



2. RS232 connection port: Central control and connect to PC through RS232 port.

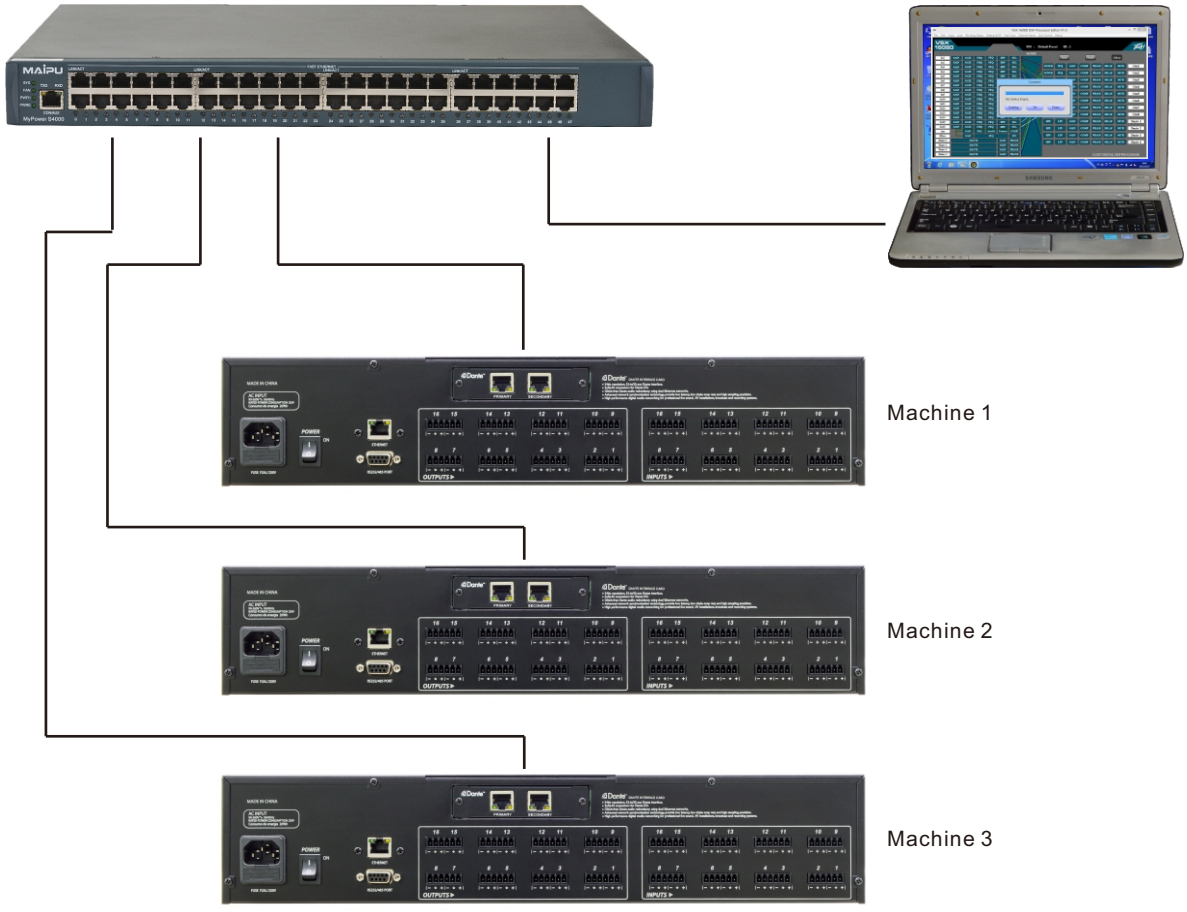
3. RS485 cascade control port: link connect several devices by RS485, you can choose different ID to control separately.

Connect several devices by link mode, connection together by series, Connection for RS232' s pin7&8, then connection to PC through converter (RS485 to RS232), link controllable several devices after setting the different ID.

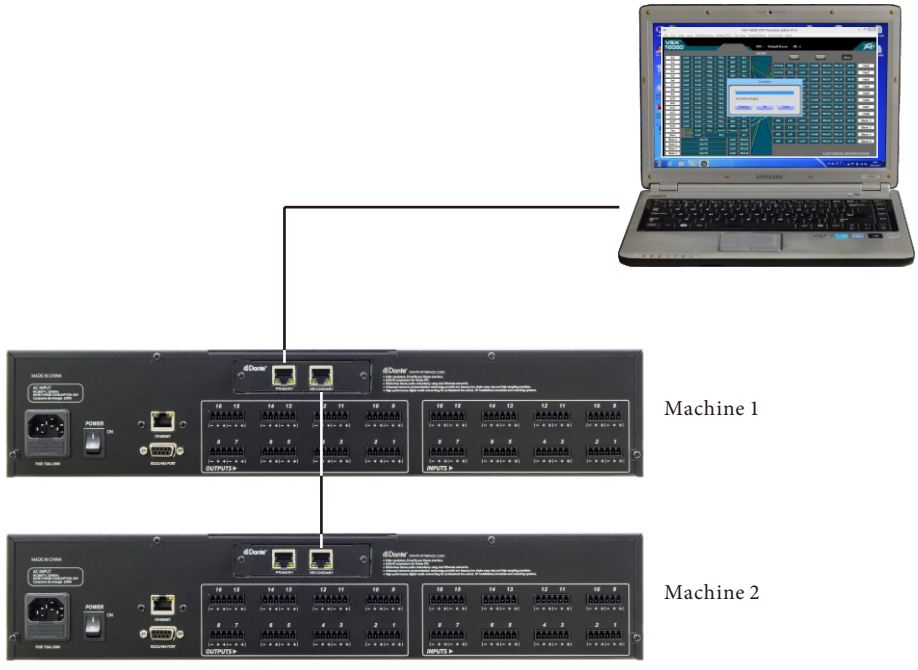


4. Dante network port connection diagram. (The connection type for equipped Dante card)

a). Can make more than multiple machines transmitting network audio through switch connection.



b). Can receiving and transmitting the network audio through series connection.



1. Control Package Format

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Data1	Data2	Date3	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0X41 ~ 0X5C	0x??	0x??	0x??	0x7D	0x7B

2. Command Detail

(1) Gain Control（0x41）

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Channel	+/-	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x41	In：0 Out：1	00~15	+：0, −：1	0x7D	0x7B

Example (In1 Gain +) : 7B7D01410000007D7B

(2) Mute Control(0x42)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Channel	No/Yes	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x42	In：0 Out：1	00~15	No:0 Yes:1	0x7D	0x7B

Example (Out1 Un Mute): 7B7D01420100007D7B

(3) Load Preset Control(0x43)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Factory/User	Preset	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x43	F：0, U：1	0~12	0	0x7D	0x7B

Example (Recall user's preset U01) : 7B7D01430100007D7B

(4) Input Volume Control (0x44)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Channel	HI-VOL	LO-VOL	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x44	00~15	0x??	0x??	0x7D	0x7B

Example (Set In1 Volume +0.0dB): 7B7D01440001187D7B

(5) Output Volume Control (0x45)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Channel	HI-VOL	LO-VOL	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x45	00~15	0x??	0x??	0x7D	0x7B

Example (Set Out2 Volume -3.0dB): 7B7D01450100FA7D7B

(6) Sub Volume Control (0x46)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Gain	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x46	In:0 Out:1	0~100	0	0x7D	0x7B

Example (Sub Input Gain 90%): 7B7D0146005A007D7B

(7) Sub Gain Control (0x47)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	+/-	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x47	In:0 Out:1	+:0, :-1	0	0x7D	0x7B

Example (Sub Input Gain+): 7B7D01470000007D7B

(8) Get Now Gain(0x48)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Channel	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x48	In:0 Out:1	00 ~ 15	0	0x7D	0x7B

MCU Return: MCU Return: 1st Byte: In/Out, 2nd Byte = Channel, 3rd Byte: 0-80(-60~-20):
0.5dB/Step, 80-280(-20~0):0.1dB/Step, 280-400(0~+12):0.1dB/Step.

Example (Read In1 volume parameter): 7B7D01480000007D7B

(9) Get Now Mute (0x49)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Channel	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x49	In:0 Out:1	00 ~ 15	0	0x7D	0x7B

MCU Return: 1st Byte: In/Out, 2nd Byte = Channel, 3rd Byte: 0x00 or 0x01 = Un-Mute or Mute

Example (Read In1 mute parameter): 7B7D01490000007D7B

(10) Get Now Preset (0x4A)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	0x30	0x00	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x4A	0	0	0	0x7D	0x7B

MCU Return: 0x00 ~ 0x0C = 0 : F00, 1-31: U01~U12
Example (Read preset parameter): 7B7D014A0000007D7B

(11) Get Now Sub Parameter (0x4B)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	0x00	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x4B	In:0, Out:1	0	0	0x7D	0x7B

MCU Return: 1st Byte: 0 ~ 100%, 2nd Byte = 0x00 or 0x01 = Un-Mute or Mute
Example (Read Sub Input parameter): 7B7D014B0000007D7B

(12) Sub Mute Control (0x4C)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	No/Yes	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x4C	In : 0 Out : 1	No:0, Yes:1	0	0x7D	0x7B

Example (Sub Output Mute) : 7B7D014C0101007D7B

(13) Get Now Level (0x4D)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	In/Out	Channel	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x4D	In: 0 Out:1 Aux: 2	00-15	0	0x7D	0x7B

MCU Return: 1st Byte: In/Out, 2nd Byte = Channel,
3rd Byte: -128 ~ -1, 0~ +127dB = 0x80 ~ 0xFF, 0x00 ~ 0x7F
Example(Read In1 Level): 7B7D014D0000007D7B
Example(Read Out1 Level): 7B7D014D0100007D7B
Example(Read Aux Level): 7B7D014D0200007D7B

(14) Aux Gain Control (0x51)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Aux/Effect	0x00	+/-	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x51	Aux: 0x02	0x00	+: 0, −: 1	0x7D	0x7B

Example (Aux Gain+): 7B7D01510200007D7B

(15) Aux Mute Control (0x52)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Aux/Effect	0x00	No/Yes	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x52	Aux: 0x02	0x00	No: 0,Yes: 1	0x7D	0x7B

Example (Aux Mute): 7B7D01520200017D7B

(16) Aux Volume Control (0x53)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Aux/Effect	HI-VOL	LO-VOL	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x53	Aux: 0x02	0x??	0x??	0x7D	0x7B

Example (Aux Volume +0.0dB): 7B7D01530201187D7B

(17) Aux On Off Control (0x55)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	0x02	Select	On/Off	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x55	0x02	1: AutoMix	0:Off 1:Yes	0x7D	0x7B

Example (Aux AutoMix On): 7B7D01550201017D7B

(18) Aux Channel Select Control (0x56)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Select	Ch 16 ~ 9	Ch 8 ~ 1	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x56	0: Aux 2: AutoMix	Bit0 ~Bit7: 0:No 1:Yes	Bit0 ~Bit7: 0:No 1:Yes	0x7D	0x7B

Example(Aux In1&In3): 7B7D01560000057D7B
Example(Aux AutoMix In5&In6): 7B7D01560200307D7B

(19) Aux FBQ Control (0x57)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	0x02	0x00	FBQ	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x57	0x02	0x00	0 : off, 1~4 : Level	0x7D	0x7B

Example (Feedback Level3): 7B7D01570200037D7B

(20) Get Aux Now Gain (0x58)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Aux/Effect	0x00	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x58	Aux:0x02	0x00	0x00	0x7D	0x7B

MCU Return: 1st Byte: Aux/Effect, 2nd and 3rd Byte: 0-80(-60~-20): 0.5dB/Step,
80-280(-20~0): 0.1dB/Step, 280-400(0~+12):0.1dB/Step
Example(Get Aux Gain): 7B7D01580200007D7B

(21) Get Aux Now Mute (0x59)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	Aux/Effect	0x00	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x59	Aux:0x02	0x00	0x00	0x7D	0x7B

MCU Return: 1st Byte: Aux/Effect, 2nd Byte: 0x00 or 0x01 = Un-Mute or Mute
Example(Get Aux Mute): 7B7D01590200007D7B

(22) Get Aux Now On Off (0x5B)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	0x02	Select	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x5B	0x02	2: AutoMix	0x00	0x7D	0x7B

MCU Return: 1st Byte: Select, 2nd Byte: 0x00 or 0x01 = On or Off
Example(Aux Automatic Mixing Switch Parameters): 7B7D015B0202007D7B

(23) Get Aux Now Ch Select (0x5C)

	0	1	2	3	4	5	6	7	8
	DLE	STX	Device Address	CMD	0x02	Select	0x00	STX	DLE
Packet	0x7B	0x7D	1 ~ 254	0x5C	0x02	0: Aux 2: AutoMix	0x00	0x7D	0x7B

MCU Return: 1st Byte: Select, 2nd Byte: Matrix
Example(Get Aux Ch Select): 7B7D015C0200007D7B

MCU WILL RETURN THE “OK” FOR CORRECT CONTROL COMMAND: 0X4F 0X4B

Communicate Paramete	Baud Rate	115200	Stop Bit	1
	Data Bit	8	Step	>=200ms
	Parity	None	ID	Default 1

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