School Sound System

IP School Intercom, Paging, Audio Messaging,
Bell Schedules and Program Audio Streaming

User Manual

Revision History

v1.07

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1 About this manual

This user manual will explicitly describe the hardware installation and the software configuration, provides installers and users the necessary information to setup and configure the system.

❖ Firmware version:

Version
v2.06

1.1 Safety instructions

- Do not expose the device to extreme temperatures, direct sunlight, humidity, or dust, which could cause fire or electrical shock hazard.
- Keep away water or other liquids from the device. Otherwise fire or electrical shock may result.
- Connect the power cord only to the type stated in this manual or as marked on the unit. Otherwise fire and electrical shock hazard results.
- When disconnecting the power cord, always grab the plug. Never pull the cord. A damaged power cord is a potential risk of fire and electrical shock hazard.
- Avoid touching power plugs with wet hands. Doing so is a potential electrical shock hazard.
- Avoid placing heavy objects on power cords. A damaged power cord is a fire and electrical shock hazard.
- Do not drop or insert metallic objects or flammable materials into the unit as this may result in fire and electrical shock.
- Do not remove the device's cover, as there are exposed parts inside carrying high voltages that may cause an electrical shock. Contact your TERRACOM dealer if internal inspection, maintenance or repair is necessary.
- Do not try to make any modifications to the device. This is a potential fire and electrical shock hazard.
- Avoid the device's ventilation slots to be blocked. Blocking the ventilation slots is a potential fire hazard.
- To prevent the unit from falling down and causing personal injury and/or property damage, avoid installing or mounting the unit in unstable locations.
- Leave enough space above and below the unit to provide good ventilation of the device. If the airflow is not adequate, the device will heat up inside and may cause a fire.
- Operate the device in an environment with a free-air temperature of between -5°C and +55°C (-40°F and +131°F).
- Do not use benzene, thinner or chemicals to clean the device. Use only a soft, dry cloth.
- If the device is moved from a cold place (e.g., overnight in a car) to a warmer environment, condensation may form inside the unit, which may affect performance. Allow the device to acclimatize for about one hour before use.
- **TERRACOM group reserves the right to update, amend, change or withdraw these functions and to introduce new functions at any time without notice.**

1.2 Notice signs

❖ Explanation of Graphical Symbols:

Note: Containing additional information.

Caution: Equipment or property can be damaged, or persons can be injures if the alert is not

observed.

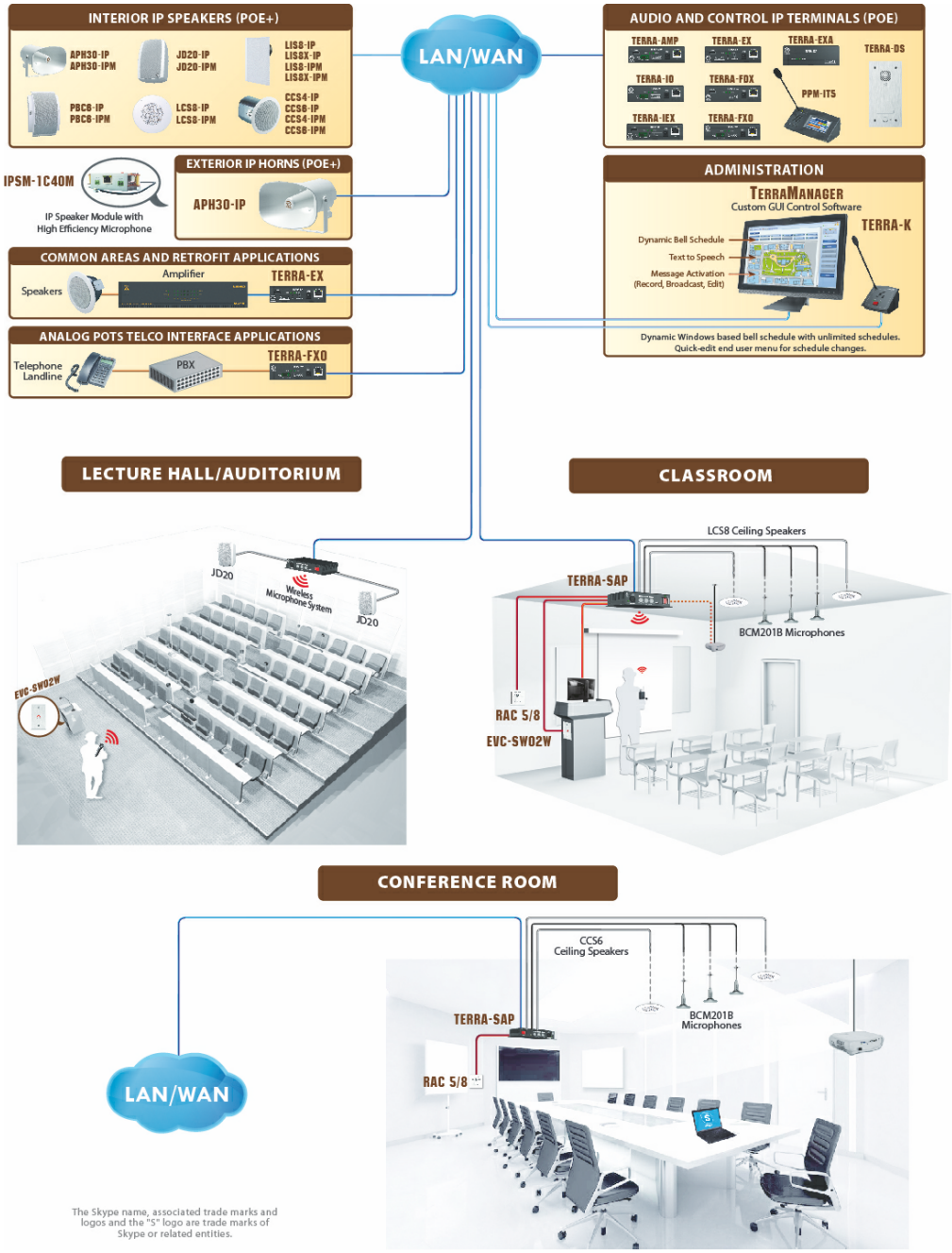
1.3 Copyright

2 System overview

2.1 School sound system

The School Sound System - a full audio over IP-based classroom solution including teaching, paging, messaging, bell scheduling, hands-free intercom & emergency communication. The system is browser-based programming and includes all the components you need to create a complete networked communications system over IP that will be an integral component to help your educational facility remain a safe and secure environment for students and faculty.

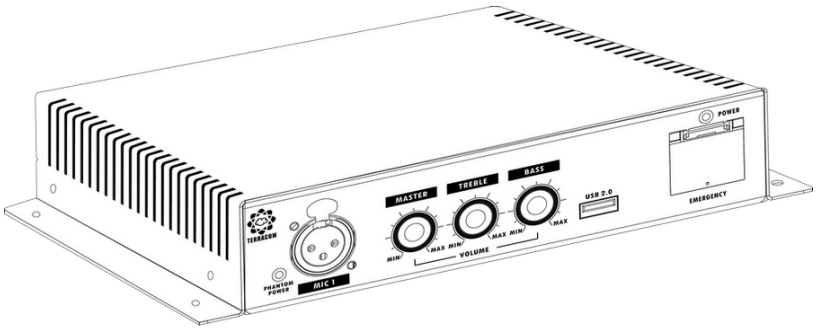
The system incorporates Terra-SAP mini audio DSP processor, a range of IP loudspeakers and BCM201W/BCM201B ceiling-mounted boundary microphones for in-classroom sound reinforcement complete with AEC and as the talkback microphone for hands-free intercom - all using the same speakers including automatic muting of the local program audio.



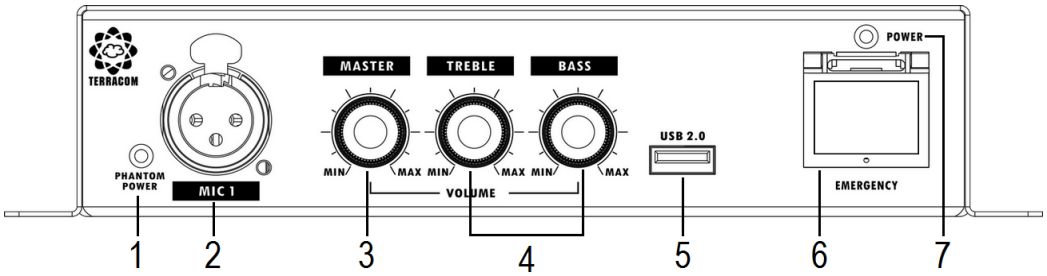
2.2 TERRA-SAP

The TERRA-SAP networkable processor is equipped with 20W x 2CH amplifier and also act as an audio hub for local connected devices such as mic/line inputs, the connection with audio-visual devices such as PC, projectors as well as contact input/outputs, a USB2.0 interface for music and/ or message storage or it can used as a record output to USB storage device. There is also a mini-USB input for connection to PC for use as web conferencing.

Local volume control and audio input selection can be managed using RAC5 or RAC8 source selector & volume control remote. In case of an emergency, press the supervised EVAC button on Terra-SAP in order to alert the central monitoring station to respond to an incident.



2.2.1 Front panel



1. Phantom power LED: This LED lights up when the phantom power DIP switch on rear panel is set as ON.
2. MIC 1: A XLR microphone input.
3. Master volume knob: A master volume knob to adjust the volume of loudspeakers which are connected to TERRA-SAP.
4. Two knobs for treble and bass adjustment.
5. USB 2.0: Connect a USB flash drive for music and/or message storage and playback (G.711, G.722, MP3 and WAV) or used as a record output to USB storage device.

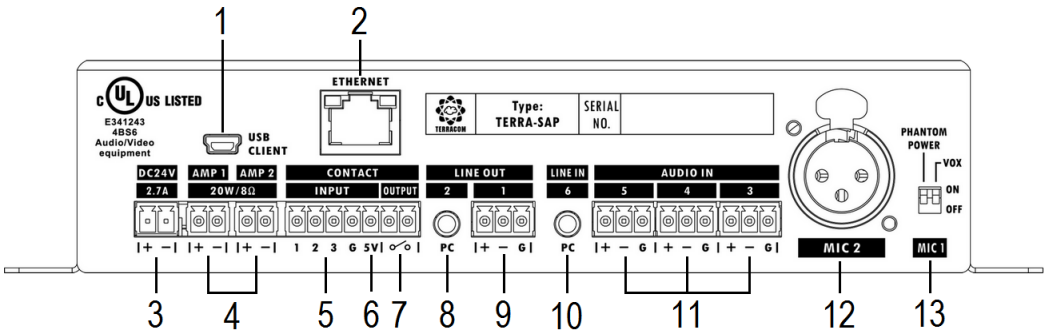
> The TERRA-SAP only supports the USB flash drive in FAT32 format with the storage capacity of below 2TB.

6. Evacuation button: Once this button is pressed, the system will enter emergency state. Its LED will light up and alert the central monitoring station. The TerraManager will display a pop-up warning window, allowing the control station to choose either to monitor or intercom. This two-state (ON/OFF) button can be programmed in web browser > I/O Control.

> When updating the firmware from v1.xx to v2.xx, the EVAC LED indicator on the front panel of TERRA-SAP will flash, and please don't turn off the TERRA-SAP during updating in case unexpected error occurs. The update time is about 80 seconds.

7. Power LED: The LED lights up when TERRA-SAP is powered.

2.2.2 Rear panel



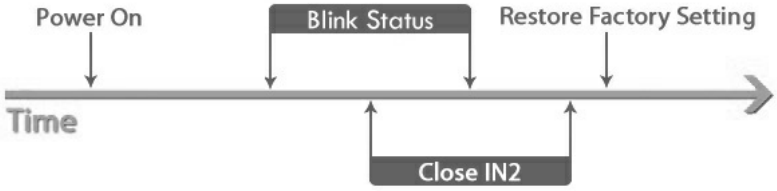
1. A Mini-USB interface to connect to PC/laptop for web conferencing such as Skype, WhatsApp etc., see How-to Remote Conferencing for details.
2. Ethernet port: Connect the TERRA-SAP to Ethernet network, allowing the system to be configured, controlled and monitored via web browser.
3. 24VDC input: Connect the supplied 24VDC power adapter (max. 2.7A) to TERRA-SAP.
4. Amp 1 & Amp 2: 20W x 2CH (class-D amp) amplifier outputs on 8 ohm load loudspeaker.

The amp output of TERRA-SAP is fed by 8 ohm load loudspeaker. However, if users wish to connect the 4 ohm speaker to the amp output of TERRA-SAP, please enable this [4 ohm speaker] setting on TERRA-SAP web browser > Setup1 > Basic Setting > Amp.

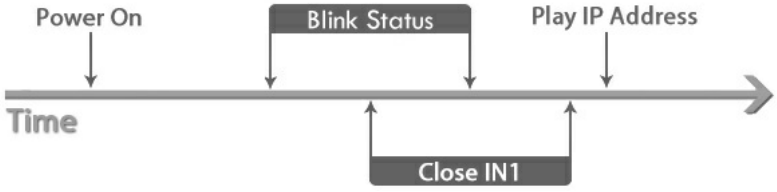
---

5. Three contact inputs: Three monitored control inputs are design to work with a simple contact such as EVC-SW01W/EVC-SW02W emergency call button, RAC 5/RAC 8 source selector and volume control remote and event triggering such as call/hang up, music play/stop, 3rd party command, record etc..

Reset the default factory setting: Short-circuit (close) the contact input 2-pin and G-pin will reset to the default factory setting (192.168.100.1 by default).



Read out the IP address: Press the red EVAC button on TERRA-SAP, and short-circuit (close) the contact input 1-pin and G-pin during the time that the LED of EVAC button is flashing, the system will read out the IP address via the connected loudspeakers.



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6. 5V: Provide 5V (200mA) for external device such as EVC-SW01W / EVC-SW02W call button or smoke detector.
7. Contact output: A relay contact output can be programmed to control an external device.
8. Line output: An audio line output (3.5mm TRS phone jack) to connect to an external device such as earphone, speaker or recording device, and listen and monitor the audio.

9. Line output: A screw-terminal balanced audio output allows to connect to external amplifier.

10. Line input: An audio line input (3.5mm TRS phone jack) for background music.

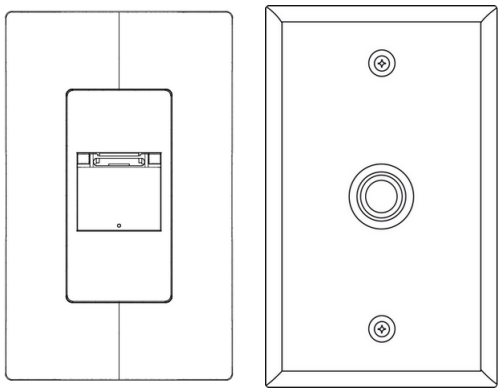
11. Audio mic inputs: Three screw-terminal balanced mic inputs for recording local sound and assignable intercom use by connecting to BCM201W/BCM201B pendant microphones, and allow the teacher and student to intercom with administration.

12. MIC 2: A XLR microphone input.

13. Phantom power/VOX DIP switch: A DIP switch for MIC 1/MIC 2 with 48VDC phantom power and voice activated (VOX). If MIC 1/MIC 2 requires phantom power supply, set the [Phantom Power] switch in ON position. If the microphone does not applicable for phantom power supply, leave the switch in OFF position.

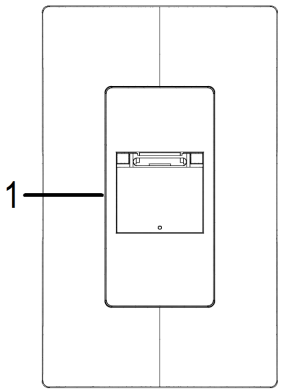
2.3 EVC-SW01W/EVC-SW02W

The EVC-SW01W/EVC-SW02W supervised emergency call button is to alert the central station where they can verify, and response to incidents.



EVC-SW01W EVC-SW02W

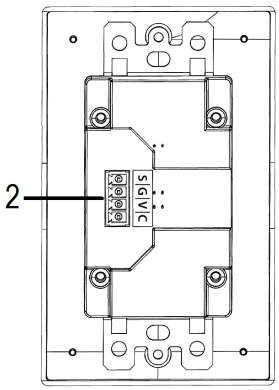
2.3.1 Front & rear panel



1. Evacuation button:

   Once this button is pressed, the system will enter to emergency state. Its LED will light up and alert the central monitoring station.

   The TerraManager will display a pop-up warning window, allowing the control station to choose either to monitor or intercom.



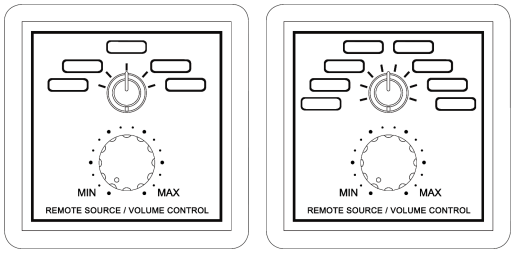
2. Control input:

4 euro-block connectors on EVC-SW01W to connect to the contact inputs of TERRA-SAP.

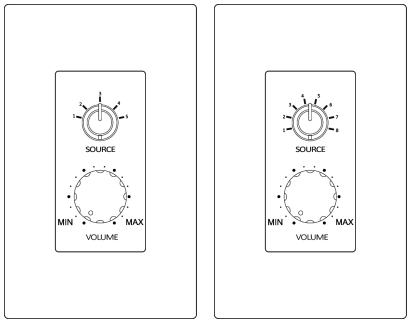
See EVC-SW01W Wiring Connection for details.

2.4 RAC 5/RAC 8

The RAC 5/RAC 8 can be used for adjusting audio level or switch audio channel remotely. The 5/8 steps knobs on RAC 5/RAC 8 can be programmed via TERRACOM web browser. The RAC 5/RAC 8 is available for US and EU type, and is powered by 24VDC.



RAC5/RAC8
(EU Type)



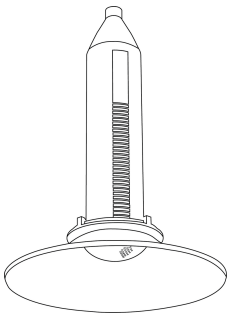
RAC5/RAC8
(US Type)

See RAC 5/RAC 8 Wiring Connection for details.

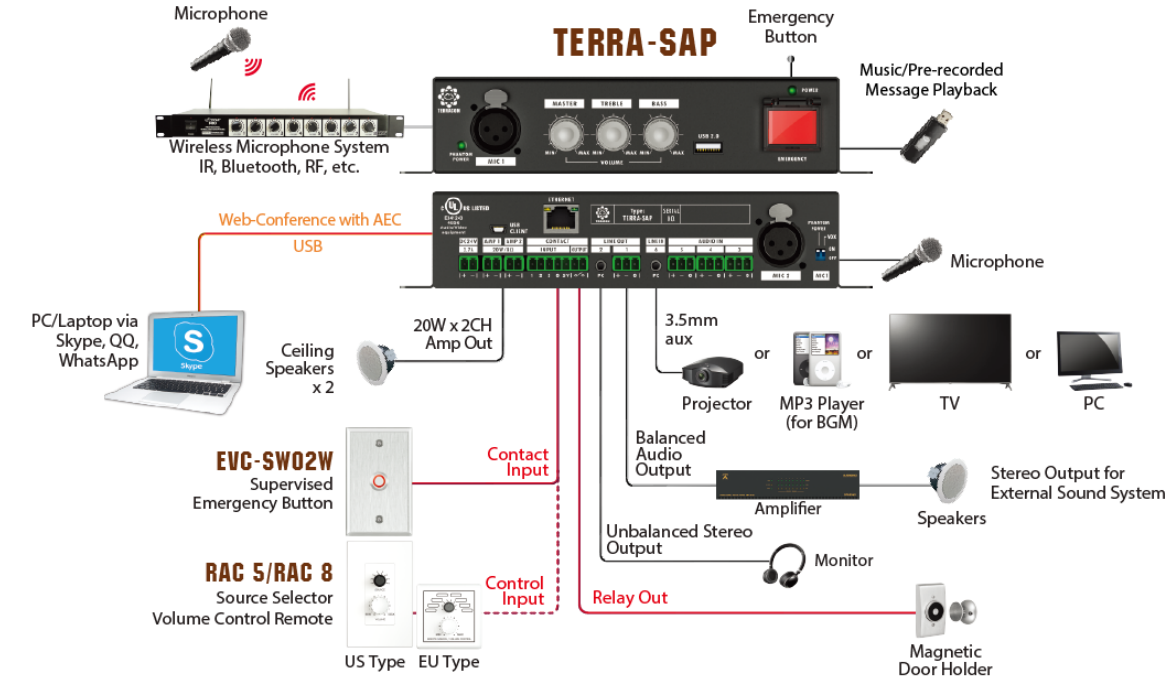
2.5 BCM201W/BCM201B

The BCM201W/BCM201B microphone is designed in high definition, omnidirectional microphone capsule, it can be connected to the balanced microphone input of TERRA-SAP amp processor, providing intercom and classroom & courtroom speech monitoring applications.

This microphone is available for white and black models.



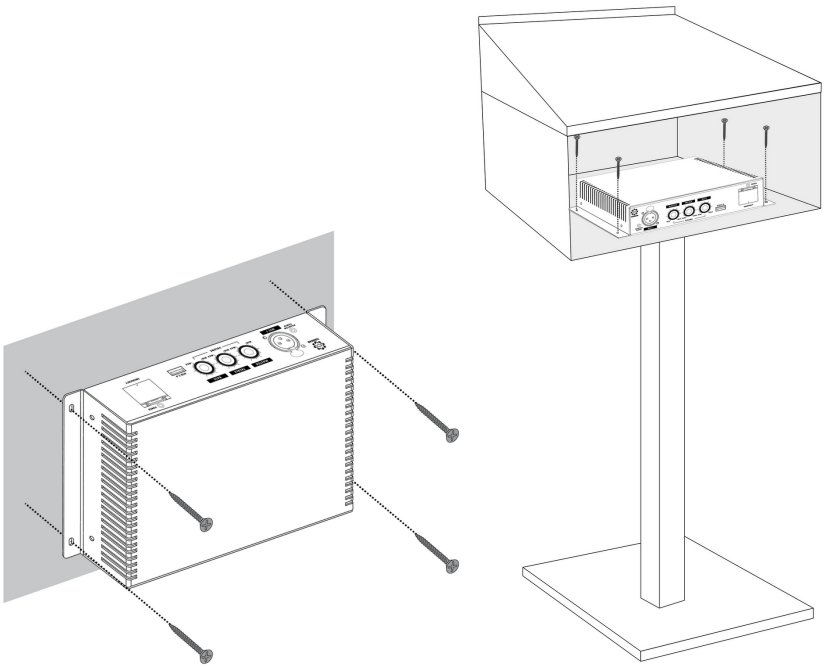
3 Hardware installation & connection



3.1 Mounting

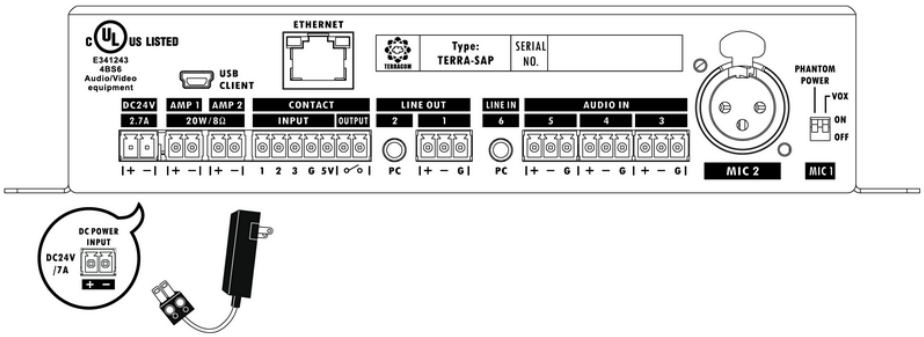
Mount the TERRA-SAP mini audio DSP processor using the supplied mounting brackets and screws.

Mount under desk or on wall - no rack is required.



3.2 Power supply

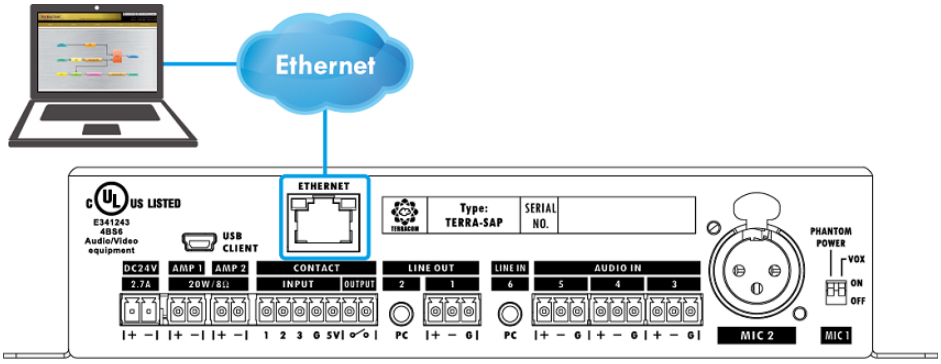
Use the supplied 24VDC power adapter to connect the TERRA-SAP to the power outlet. The Power LED on the front panel will glow green when power is applied.



If the TERRA-SAP unit is not powered for a period of time (approx. 23 days), the internal battery will be under low voltage, and result in incorrect system time of TERRA-SAP. Should the system time is incorrect, please connect the power supply of TERRA-SAP unit, and set the system setting or enable the NTP setting on TERRA-SAP web browser again.

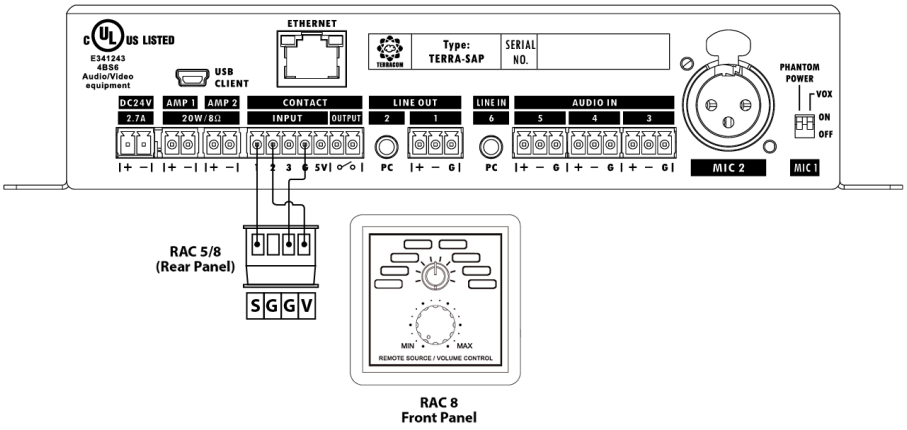
3.3 Ethernet connection (RJ45)

Use the supplied Ethernet cable (CAT5/6) to connect the TERRA-SAP to a PC/laptop. The web browser-based software shall provide all the necessary tools to setup, configure, control and monitor the TERRA-SAP.



3.4 RAC 5/RAC 8

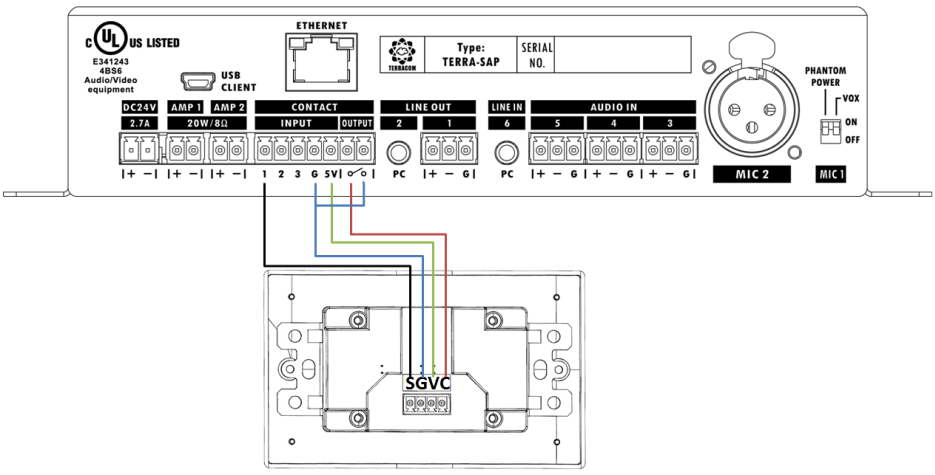
Connect the pins of RAC 5/RAC 8 to the contact input of TERRA-SAP, see the picture as below.



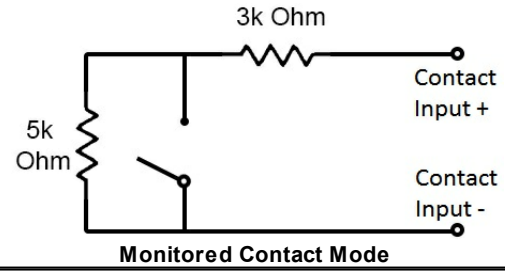
The RAC 5/RAC 8 is using in analogue connection. It can be influenced by nearby power cables or 100V speaker lines. To avoid this, please use STP CAT5/6/7 with metal shielded cable.

3.5 EVC-SW01W

Connect the pins of EVC-SW01W to the contact input and contact output of TERRA-SAP, see the picture as below.



❖ Contact Input (4 status: active, inactive, open and short)

• Non-isolated analogue interfaces with internal pull-up to +3.3V by 6.2k ohm	
• 4 monitored analogue contact thresholds ○ Faulty-open circuit: > 2.2 VDC ○ Inactive voltage: 1.5 ~ 2.2 VDC ○ Active voltage: 1.5 ~ 0.8 VDC ○ Faulty-short circuit: < 0.8 VDC	

Monitored Contact Mode

4 Configuration - Web Browser

More advanced configuration such as volume, PEQ, audio routing, monitor, control, event and bell scheduler and paging with priority management etc.. can be configured by a dedicated web browser.

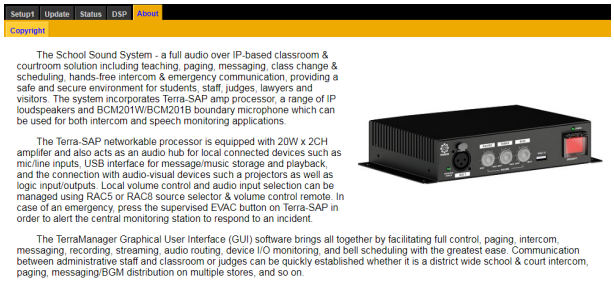
If this is the first web configuration, please update the firmware to the latest version. Go to Update > Firmware for details.

4.1 Getting started

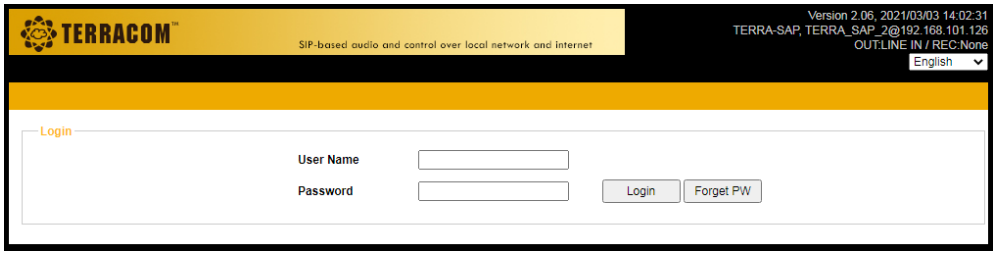
1. Connect the TERRA-SAP to network switch.
2. Open the web browser on your PC/laptop. The TERRA-SAP device is compatible with and optimized for the latest version of these web browsers:
   - Chrome (we recommend to use it)
   - Safari
   - Firefox
   - Opera
   - Edge

   Internet Explorer is not supported.
3. Enter the default IP address into the address bar, then you can open the webpages of TERRA-SAP device.

Default setting	Web browser
IP address	192.168.100.1
Subnet Mask	255.255.255.0
Gateway	192.168.100.254

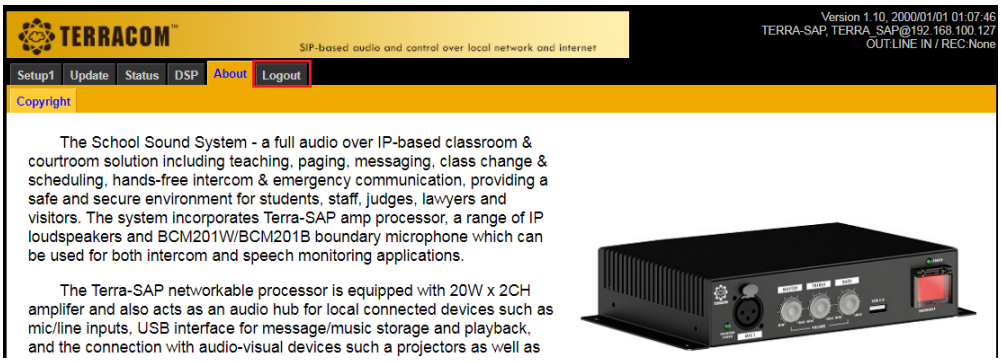


4.2 Login/logout



❖Login/logout from TERRA-SAP web browser

1. Enter a valid user name and password.
2. To logout, click the [Logout] button located on the upper tab.



❖Forget Password

1. Click [Forget PW] button if users forget the password, but you need to enter the user name first.
2. Then a pwd. file will be downloaded into your PC/laptop, please send this pwd. file to our technical team to retrieve the password.

4.3 IP Address

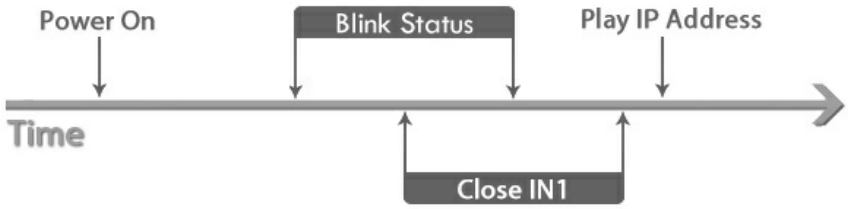
If you lose the IP address of your TERRA-SAP device and cannot connect to the web browser, please see the following instruction.

- With only one device:

1. Read Out the IP Address

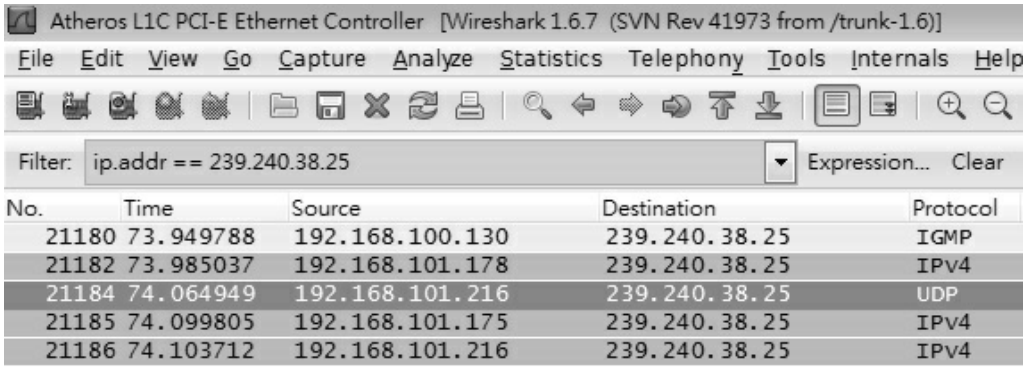
   1) After plugging the 24VDC power input on TERRA-SAP, the red EVAC button on the front panel of TERRA-SAP will flash 5 times.

   2) Short-circuit (close) the contact input 1-pin and G-pin during the time of the red EVAC button is flashing, the system will read out the IP address via the connected loudspeakers. Make sure the loudspeakers is connected to the amplifier outputs of TERRA-SAP.



2. Using Packet Analyzer software

   Download the free Packet Analyzer software such as Wireshark and set the filter as "ip.addr == 239.240.38.25", a list of all TERRACOM units connecting to your LAN will be displayed.



4.4 Network bandwidth and bitrate

❖ The data rate over the network is calculated as below,

- Audio Streams: It is based on the number of audio stream channels and the audio format.
- Control Streams: Each TERRACOM device is estimated at 28kbps.

❖ The total bitrate is calculated using the formula (in kbps) as below,

((number of products)* 28kbps) + ((number of streams) * stream bitrate)

- The example below is using 8 Terra-FDX units + 2 TerraManager, and altogether use 10 channels audio streams (MP3 format) at same time.

  ((8+2) * 28) + (10 * 150) = 1780Kbps.

❖ Audio Stream Format

- Mono:
  - MP3: 150kbps
  - G.722: 90kbps
  - G.711ulaw: 90kbps
  - G.722alaw: 90kbps
  - PCM16k: 280kbps
  - WAVE: 780kbps
- Stereo:
  - MP3: 150kbps
  - WAVE: 1560kbps

4.5 IP information

❖ The TERRACOM products are using the following Multicast address (IGMP)

- 239.211.34.48: for ATEIS-NET status display
- 239.211.34.45~49: for IDA8 or BOUTIQUE IGMP address
- 239.240.38.25, Port 9000/9002: for Machines status
- 239.240.38.25, Port 8998: for Paging control
- 239.240.38.25, Port 8995: for Machines display status
- 239.241.100.0 ~ 239.241.100.255, Ports 2000 ~ 3000: for Audio steam
- 239.240.38.25, Port 9002: for BOUTIQUE protocol

❖ The Local Host Ports of TERRACOM products

- 20: File Sync
- 21: File Sync
- 20: Web Server
- 80: website
- 123, 14500, 4096: NTP Server
- 161: SNMP protocol

- 5060: SIP call
- 6912: RTP address
- 8010: Third Party commands
- 26570: Remote Control
- 19760: for IDA8
- 19761: 3rd party control
- 19762: for IDA8
- 19770: for IDA8
- 19780: for IDA8
- 19781: for IDA8
- 19782: for IDA8
- 9002: BOUTIQUE
- 9999: TerraServer File Access

4.6 Setup1

4.6.1 Basic setting

❖ **Network**

- DHCP: Enable/disable the DHCP (Dynamic Host Configuration Protocol).
  - IP Address: Click to change the IP address to fit your network.
  - Subnet Mask: Depend on the LAN where the TERRA-SAP device is located.
  - Gateway Server: The IP address of the gateway server.
  - DNS: Tick the checkbox to enable the DNS server and set the IP address.

❖ **System Time**

- NTP Client Service: Enable the NTP setting. If the NTP is activated, the system date/time of TERRA-SAP will be synchronized by NTP server.
- Timezone: The timezone of your Terracom devices.
  - + NTP Server IP: Set the IP address of NTP Server.
  - + Retrieve Internal: Set the internal to update the system time.
- Date/Time: If the NTP Client Server is disabled, user shall manually set the time and the timezone of your TERRA-SAP.


If the TERRA-SAP unit is not powered for a period of time (approx. 23 days), the internal battery will be under low voltage, and result in incorrect system time of TERRA-SAP. Should the system time is incorrect, please connect the power supply of TERRA-SAP unit, and set the system setting or enable the NTP setting on TERRA-SAP web browser again.


The changes in [System Time] will also affect the Scheduler function on web browser.

- Daylight Saving Service: Enable/disable the Daylight Saving Time function on TERRA-SAP.
  - + Time difference: Define the time to be an hour/a minute earlier or more.
  - + Type: Choose [Date] or [Week] option to define the period of Daylight Saving Time.
  - ++ Start Date / ++ End Date: Set the start/end date of Daylight Saving Time.

- ++ Start Time / ++ End Time: Set the start/end time of Daylight Saving Time.

❖ **Third Party Control**

- Network Control Service: Enable/disable the Network Controls Service.
  - Network Port: Set the local network port.
  - Network IGMP Enable: Enable/disable to use IGMP address, the default network port is 8010.
    - Network IGMP Address: Set the IGMP address.

❖ **AMP**

- 4 ohm speaker: The 20W x 2CH amp output of TERRA-SAP is fed by 8 ohm load loudspeaker. However, if users wish to connect the 4 ohm speaker to the amp output of TERRA-SAP, please enable this [4 ohm speaker] setting, then the [Level] setting on DSP > Amp Output window page will be mandatory to set from -90dB ~ -6dB.

If the TERRA-SAP is fed by 8 ohm load speaker, the original parameter of [Level] setting on DSP > Amp Output window page is -90dB ~ 20dB.

❖ **SIP**

- Transfer Protocol: Select either TCP or UDP for the communication protocol between the TERRA-SAP and SIP Server. You can only choose one protocol at a time.

The transfer protocol of the TERRA-SAP and SIP Server should be the same.

- Firewall Traversal Mode: Use [TERRA Net] to relay the audio packet through TCP/UDP or use [SIP Server].
- + Username
  - TERRA Net: Set the calling name for SIP call, normally this username is defined in the telephone number.
  - SIP Server: Set the username (account) for using to connect to the SIP server, this username is the account you've registered on SIP server.
- + Password (SIP Server only): Enter the password for using to connect to the SIP server, this password is the one you've registered on SIP server.
  - : Enable the checkbox to reveal the hidden password.
- SIP Server IP (SIP Server only): Set the IP address of SIP server which you've registered on SIP server.
- SIP Port: The network port for SIP protocol, set 5060 by default.
- RTP Port: The network port for RTP protocol for receiving and transmitting audio, set 6912 by default.
- Identification Send Interval (sec): The TERRA-SAP supports to paging to other TERRACOM devices via Internet Paging Server (IPS). Here you can set the time interval of sending IPS signal.

If the time interval is set higher, it can decrease the occupied bandwidth on network; but it will also cause the response time which IPS detects the TERRA-SAP become slower.

- Audio Codec: The supported audio codec for SIP (G.711, G.722 and PCM16K decoder).
- Global Priority: When TERRACOM devices are calling (SIP intercom) TerraManager, the order of which device can intercom with TerraManager shall be based on Global Priority setting. 1 is the highest priority, and 99 is the lowest priority.
- Time to Stop Ring: The SIP call will be hung up after the set time. If sets up as 0 second, it won't

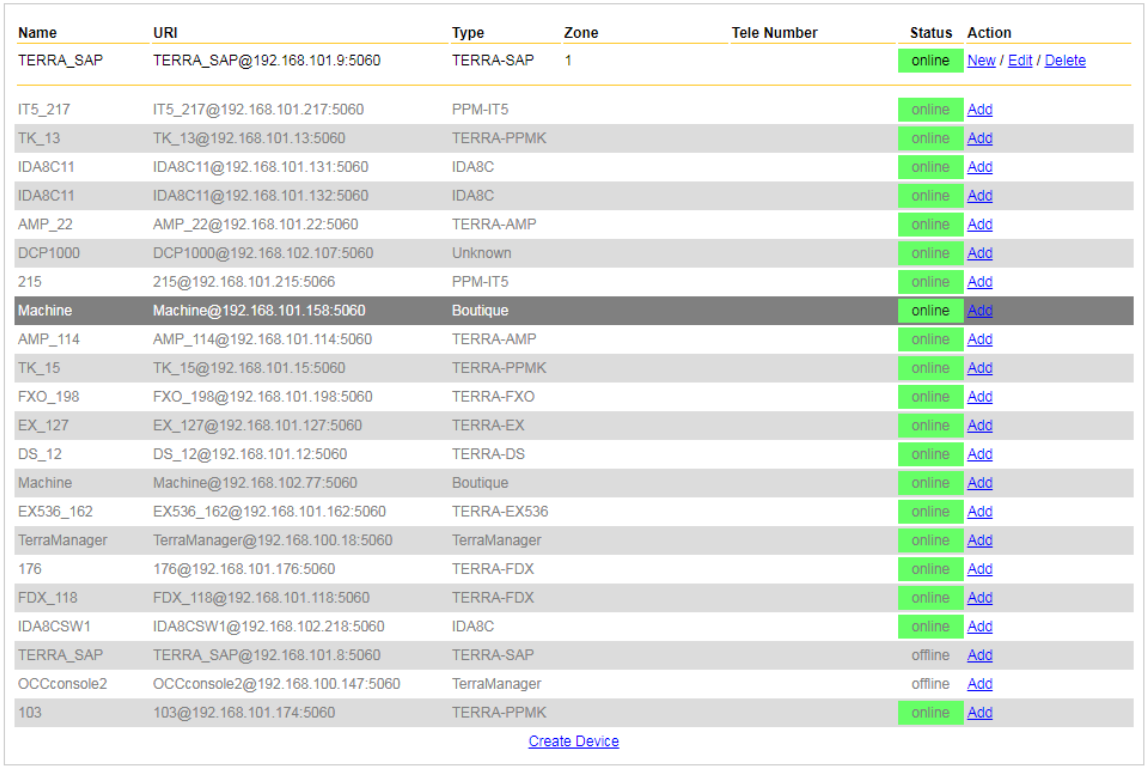
stop ringing.

- Chime Volume: The volume of pre-chime/post-chime.
- Ring Volume: The volume of ring tone.
- SIP Auto Answer: Enable/disable to pick up the SIP call automatically.
- SIP Stop Ringing: Enable/disable to ring when receiving SIP call.
- Pre-Chime/Post-Chime: Support to program the pre-chime/post-chime setting when making SIP call and paging to chosen zones.
- Answer-Tone: Choose an audio tone which this tone will be played to your caller after the caller picks up the call.
- SIP Active/Inactive: Trigger an action after the SIP call has picked up or trigger an action after the SIP call ends. The triggered action can be the Contact Out, Command (string) and Multi Function.
- Ringing Active/Inactive: Trigger an action when the SIP ringtone starts ringing or trigger an action after the SIP ringtone ends. The triggered action can be the Contact Out, Command (string) and Multi Function.

4.6.2 Device

List the TERRACOM devices located in the same LAN or the devices which users add in manually. The different color on status of device will be indicated as below.

- Black: The devices that users manually add in.
- Grey: The devices are located in the same LAN, but they haven't been added into the Device List.



Name	URI	Type	Zone	Tele Number	Status	Action
TERRA_SAP	TERRA_SAP@192.168.101.9:5060	TERRA-SAP	1		online	New / Edit / Delete
IT5_217	IT5_217@192.168.101.217:5060	PPM-IT5			online	Add
TK_13	TK_13@192.168.101.13:5060	TERRA-PPMK			online	Add
IDA8C11	IDA8C11@192.168.101.131:5060	IDA8C			online	Add
IDA8C11	IDA8C11@192.168.101.132:5060	IDA8C			online	Add
AMP_22	AMP_22@192.168.101.22:5060	TERRA-AMP			online	Add
DCP1000	DCP1000@192.168.102.107:5060	Unknown			online	Add
215	215@192.168.101.215:5066	PPM-IT5			online	Add
Machine	Machine@192.168.101.158:5060	Boutique			online	Add
AMP_114	AMP_114@192.168.101.114:5060	TERRA-AMP			online	Add
TK_15	TK_15@192.168.101.15:5060	TERRA-PPMK			online	Add
FXO_198	FXO_198@192.168.101.198:5060	TERRA-FXO			online	Add
EX_127	EX_127@192.168.101.127:5060	TERRA-EX			online	Add
DS_12	DS_12@192.168.101.12:5060	TERRA-DS			online	Add
Machine	Machine@192.168.102.77:5060	Boutique			online	Add
EX536_162	EX536_162@192.168.101.162:5060	TERRA-EX536			online	Add
TerraManager	TerraManager@192.168.100.18:5060	TerraManager			online	Add
176	176@192.168.101.176:5060	TERRA-FDX			online	Add
FDX_118	FDX_118@192.168.101.118:5060	TERRA-FDX			online	Add
IDA8CSW1	IDA8CSW1@192.168.102.218:5060	IDA8C			online	Add
TERRA_SAP	TERRA_SAP@192.168.101.8:5060	TERRA-SAP			offline	Add
OCCconsole2	OCCconsole2@192.168.100.147:5060	TerraManager			offline	Add
103	103@192.168.101.174:5060	TERRA-PPMK			online	Add

Create Device

- Name: The name of device.
- URI: The URI of device.
- Type: The type of device.

- Zone: The paging zone of the device.

  The max. number of supported zones is 1024.

- Tele Number: The telephone number will be displayed when the TERRA-FXO device is connected.
- Status: The green button will indicate the device is in online status, and grey button indicates the device is in offline status.
  - Online (green): Device is online (connected).
  - Offline (grey): Device is offline (disconnected).
  - Paging: Device is currently paging.
  - Phone: Device is currently in intercom.
- Action:
  - Add/New: Create a new device in the device list which the zone settings require to be different from the same device. For example, the zone setting of TERRA-FDX on first device is Zone 1, and on the second device is Zone 2, see Figure 1.

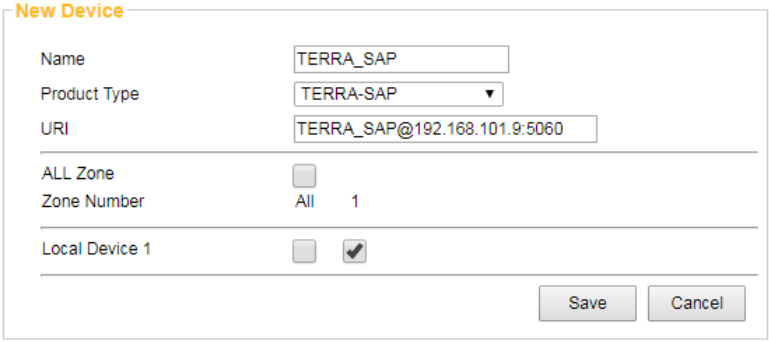


Figure 1

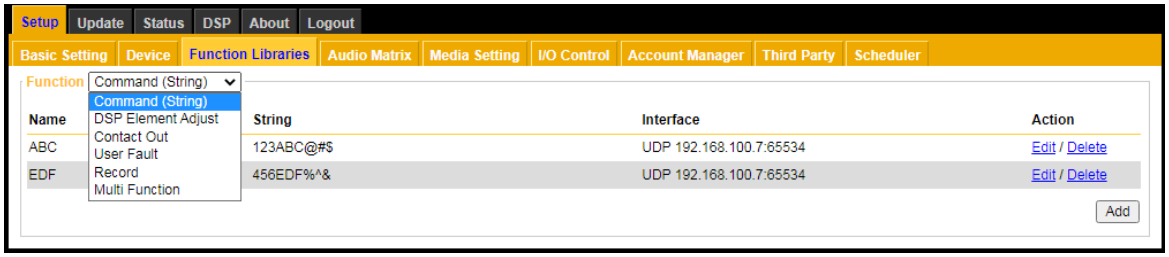
  - Edit/Delete: Edit/delete the device.
- Create Device: Manually add a new device in the device list, see Figure 2.

Figure 2

4.6.3 Function libraries

The [Function Libraries] allows to set the functions and action for controlling the TERRA-SAP device. Follow the steps to create an action.

1. Path: TERRA-SAP web browser > Setup 1 > Function Libraries.
2. Select the function from drop-down box, and click [Add] button.



❖Function

- Command (String)
- DSP Element Adjust
- Contact Out
- User Fault
- Record
- Multi Function

4.6.3.1 Command (String)

TERRA-SAP sends command string to 3rd party devices such as TERRACOM device, IDA8 processor, BOUTIQUE controller etc..

- Name: The name of this [Command String] action.
- String: The code of the string will depend on the 3rd party devices. The picture above is an example of sending the command string in ASCII code to Ateis processors (IDA8, BOUTIQUE, UAP G2, ECS, LAP G2T), the Ateis processors use Hex code, then users need to change the string in Hex code to ASCII code. The Hex code is %XXh, the XX indicates the character of Hex code.

For TERRACOM device: accept in ASCII code.
For BOUTIQUE processor: accept ASCII code.
For ATEIS processor (IDA8, UAP G2 etc.): accept Hex code.

- Interface: Choose the protocol of sending the command string, Ethernet UDP by default.
- IP Address: Set the IP address of TERRACOM device.
- Port: The network port setting requires to be the same as the TERRACOM device, IDA8 device, BOUTIQUE device, see the table as below.

Default Port	
Terracom device	8010
IDA8, ECS, LAP	19761
BOUTIQUE	8010

- Sending Interval (ms): The interval of sending the command string to TERRACOM device, IDA8

device, BOUTIQUE device.

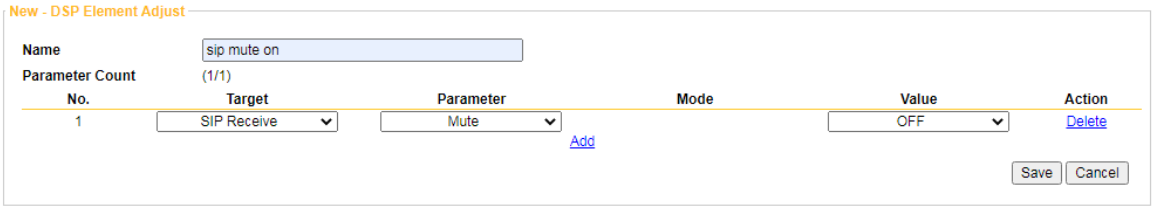
- Sending Time(s): The device will stop sending the command string after receiving the answer string from the 3rd party device.

4.6.3.2 DSP Element Adjust

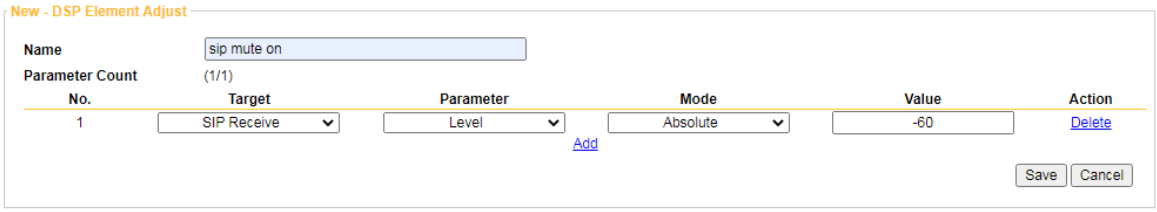
The [DSP Element Adjust] event is used for adjusting the DSP parameter such as the audio level of input source.

Firstly, click [Add] button to create a new parameter setting.

❖Mute On/Off



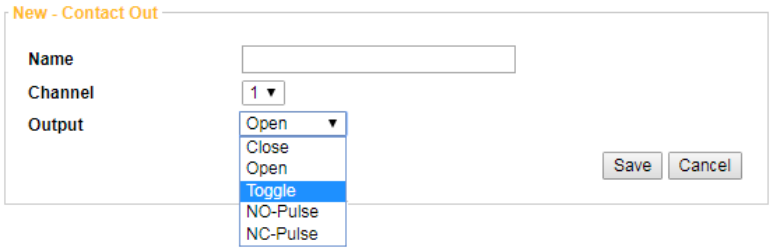
❖Level Control



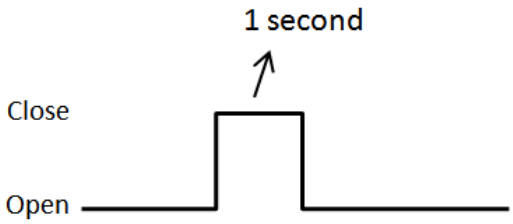
- Name: The name of this [DSP Element Adjust] action.
- Parameter Count: Display the number of the added parameter setting(s) and the max. number of parameter settings. Currently it can be used for controlling one DSP element setting only.
- Target: The [Target] combo box lists all the inputs/outputs of TERRA-SAP on [DSP Function] window. Choose a type of input/output which you wish to adjust the element of this chosen input/output.
- Parameter: The type of elements include Mute and Level (dB).
- Mode: The [Mode] combo box will be activated when choosing [Level] option on [Parameter] combo box.
  - Absolute: The level adjustment will follow the value users set on [Value] grid, and change the current value to the same value as [Value] gird. For example, if the [Value] gird is set as -60dB, and the current level value is -50dB, and once this event is triggered, the level of input/output will be change to -60dB.
  - Relative: The level adjustment will follow the value users set on [Value] grid, and increase/decrease the level value when each time the event is triggered. For example, if the [Value] grid is set as -10dB, and the current level value is -35dB, and once this event is triggered, the current level value will be change to -25dB (-35dB minus -10dB = -45dB).
- Value: Set the parameter to the assigned value such as level control and mute on/off.
- Action: Click [Delete] button to delete the chosen parameter setting.

4.6.3.3 Contact Out

The contact output of TERRA-SAP can be programmed and send a pulse or a static closing/opening to an external device

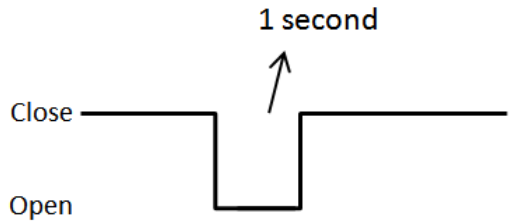


- Name: The name of this [Contact Out] action.
- Channel: The contact output channel on the rear panel of TERRA-SAP.
- Output:
  - Open: The contact output's channel is opened when the action is triggered.
  - Close: The contact output's channel is closed when the action is triggered.
  - Toggle: Trigger the relay switch of contact output's channel between open and close.
  - NO-Pulse: The NO (normally open) contact is opened, and when the action is triggered, the contact is closed for 1 second.



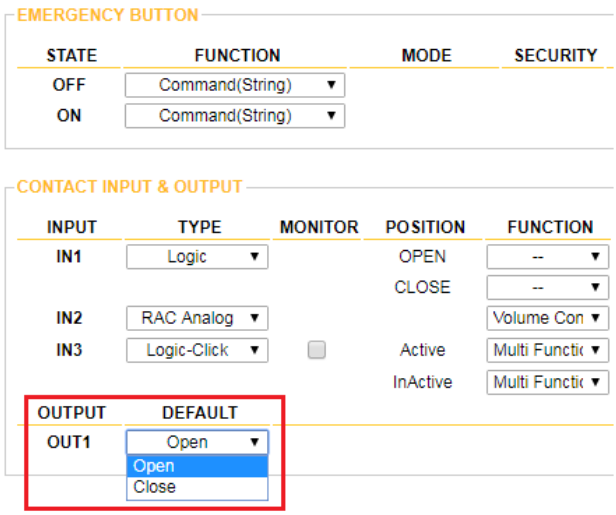
NO-Pulse

  - NC-Pulse: The NC (normally close) contact is closed, and when the action is triggered, the contact is opened for 1 second.



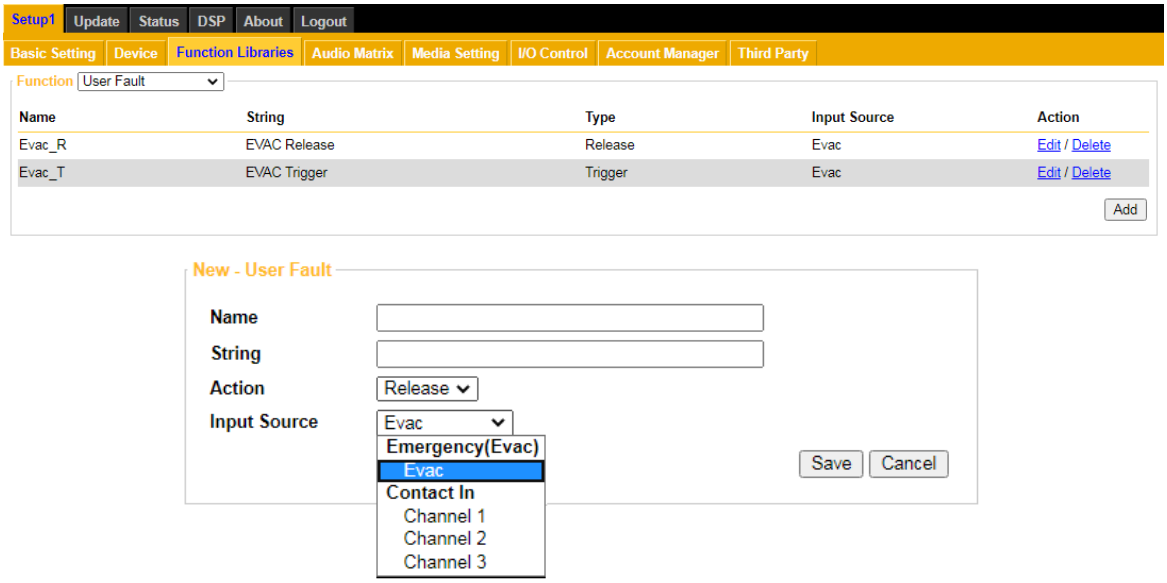
NC-Pulse

When choosing [NO-Pulse] or [NO-Pulse] option, please set the default state (open or close) of relay output on I/O Control window > Contact Output, see the picture below.



4.6.3.4 User Fault

Create the user-defined fault (such as EVAC trigger/EVAC release etc.), and once this user-defined fault is being triggered/released, the fault can be displayed on the [Monitor] window of TerraManager software.

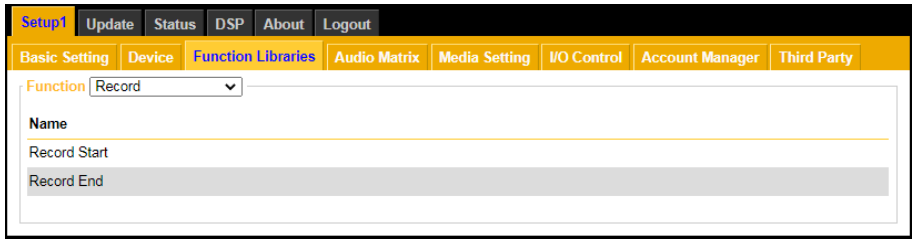


- Name: The name of this [User Fault] action.
- String: The display message of TerraManager software > Monitor window.
- Action: The action (Trigger/Release) of this User Fault.
- Input Source: Select the source (EVAC button or Contact Input of TERRA-SAP) to trigger/release the [User Fault] action.

After completed the User Fault setting, please go to I/O_Control_window to continue configuring its control setting.

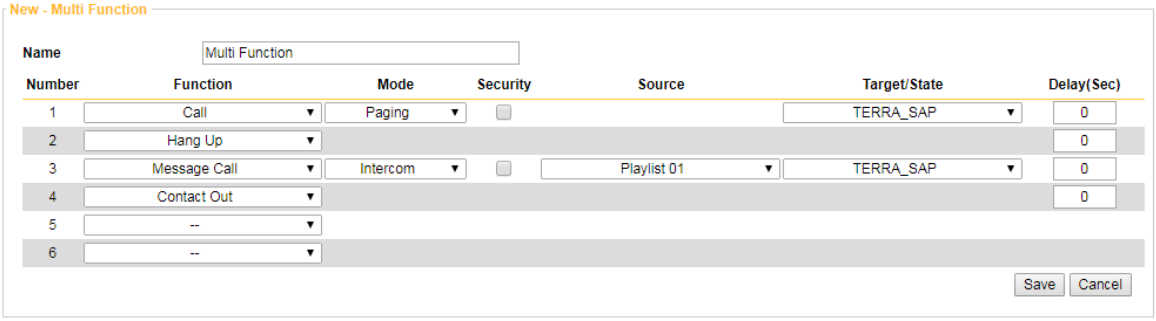
4.6.3.5 Record

Display the built-in Record function (Record Start/Record End) of TERRA-SAP, and allows users to assign the [Record Start]/[Record End]] action on I/O Control > Record window.



4.6.3.6 Multi Function

Create a group of action with multiple functions. There are three default functions - [Call Function], [Message Function] and [Hang up Function]. If users wish to use other functions such as [Contact Out], please create it on [Function Libraries] first, then the function you create will be listed on [Function] drop-down box.

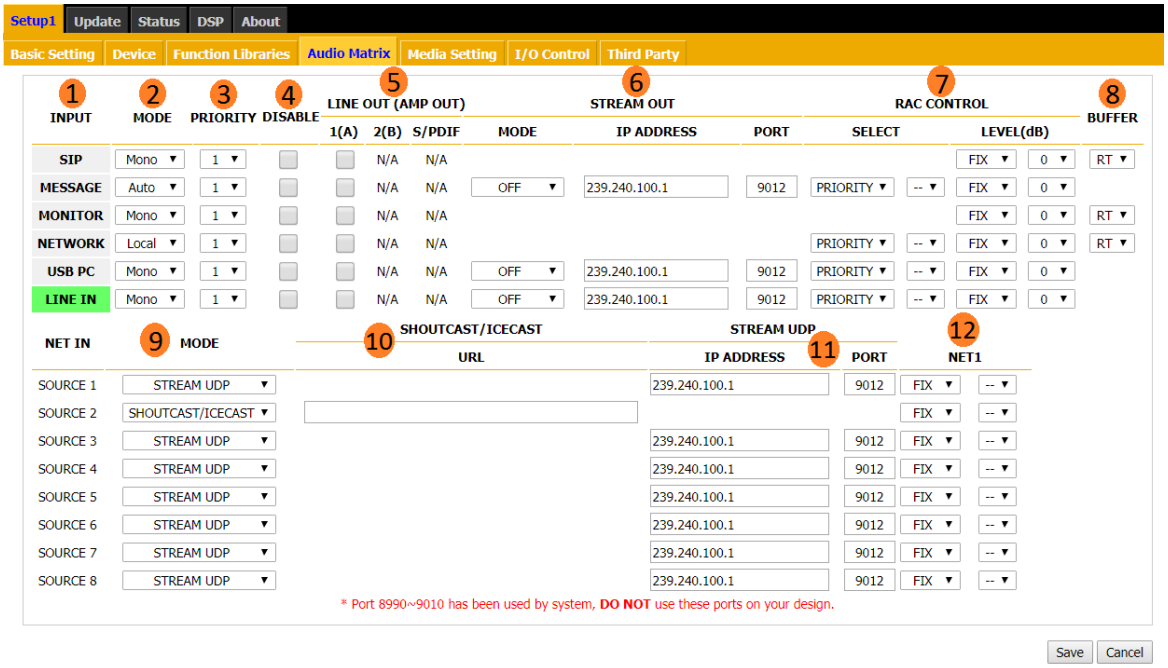


- Name: The name of this [Multi Function] action.
- Function: Select a function from the drop-down list, these functions will be triggered by the order of the list.
- Mode: Choose the calling mode (intercom/paging).
- Security: If the [Security] option is enable, the caller cannot hang up the call during paging unless the caller cancels the call itself.
- Source (message call only): Choose a playlist which you've created on Setup 1 > Media Setting.
- Target/State: Choose a TERRACOM device to paging/SIP intercom, play message etc..
- Delay (Sec): The delay time between the previous action and the next upcoming action in [Multi Function] list.

4.6.4 Audio matrix

The Audio Matrix allows to manage all audio input/output with the following functions:

- Audio routing with priority.
- Audio routing with RAC 5/8.
- Volume control depends on audio source.
- Announcement has different volume with music.
- Send network stream.
- Play network stream.



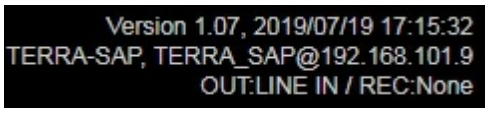
1. Input: The audio input sources.
   - SIP: SIP calls.
   - MESSAGE: Play message audio input.
   - MONITOR: The monitoring audio input from other TERRACOM devices.
   - NETWORK: Play network stream.
   - USB PC: The audio input from the connected PC via mini-USB port of TERRA-SAP.
   - LINE IN: The LINE IN-PC audio input of TERRA-SAP.
2. Mode:
   - Mono: Mono channel.
   - Auto: Auto play the message files from built-in playlist or external USB flash drive after the device is powered on.
   - Local: Receive the network stream (Source 1~8).
   - TM: Proceed audio routing via TerraManager (TM).
3. Priority: Set the priority of the SIP/MIC IN/LINE IN/MESSAGE/NETWORK.

Always set the the priority of SIP input as "1" (the highest priority), otherwise the SIP call will be left aside. The SIP includes Call, Paging Group and Pre-define Message.

The priority of source of will be based on the priority setting here. If the priority of input source is the same, the priority order will be followed by "first in first serve" basis.

---

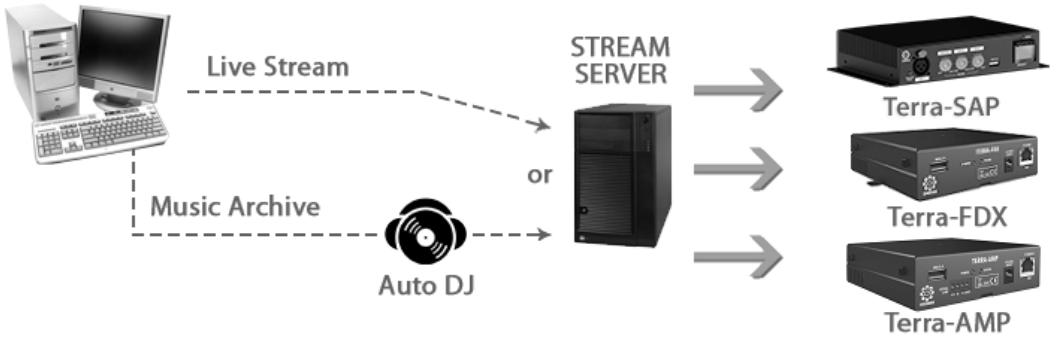
4. Disable: When enables the [Disable] option, the corresponded audio input source will no longer output even its priority is higher than other input sources.
5. Line Out (AMP Out): Tick the checkbox to enable the audio output channels. The current audio outputs will be shown at the upper-right of the TERRA-SAP web browser. For example, it will display MESSAGE during message play.



6. Stream Out: Send the network streams.
   - Mode:
     - G.722, G.711, PCM16K, WAVE, MP3: Choose the audio encoder of LINE-IN and MESSAGE input.
     - TM: Choose [TM] to use the LINE IN input and MESSAGE input as the audio routing source of TerraManager (TM).
   - IP: Set the IP address which TERRA-SAP streams out the audio to network. TERRACOM device supports to receive the Multicast IP address.
   - Port: Set the network port for RTP protocol for transmitting audio.

Port 8990~9010 has been used by system, DO NOT use these ports on your design.

7. RAC Control
   - Select: Assign which contact input channel (IN1/IN2/IN3) of TERRA-SAP will be used for channel selection of RAC 5/8 (including the sources from NET1).
   - Level (dB): Either set a fixed level for an assigned source channel or control the level with the rotary knob of RAC 5/8, see How-to: Use RAC for music/source selection and level control for details.
8. Buffer: Set the buffer time (by second) before the receiving input sources. This function will be particularly helpful for a Terracom system which multiple Terracom devices are located in different area and lots of network switches are connected, this will cause a delay time for audio transmission for the devices located at remote area, then please set the Buffer in longer delay time. If user wants to play the message audio in real-time for example, please set [RT] Buffer.
9. Mode: Choose a received type of network stream (Stream UDP or SHOUTcast/Icecast) on Source 1~Source 8.



10. SHOUTcast/Icecast URL: Set the URL, and receive the network radio using SHOUTcast or Icecast. It may cause the sound quality problem if the audio received from the SHOUTcast/Icecast isn't in 48k sampling. To use an Icecast Streaming Media Server, see Icecast for details.
11. Stream UDP: Set the IGMP IP address and its port, and receive the network streaming using Stream Multicast. The IDA8 and all the TERRACOM devices including TerraManager will use the [Stream UDP] type.
12. Net 1: Assign a RAC 5/8 and its channel, and use this RAC 5/8 to switch the network stream source (Source 1~Source 8).

IN1 indicates as the contact input channel 1 on the rear panel of TERRA-SAP.

4.6.4.1 How-to: Use RAC for music/source selection and level control

1. Go to I/O Control > Contact Input & Output and select a [RAC 5/8] for channel selection, and select [RAC Analog] for controlling the source level which is currently playing. Here we assign the [Channel Select] to IN1 and [Volume Control] to IN2, see Figure 1.

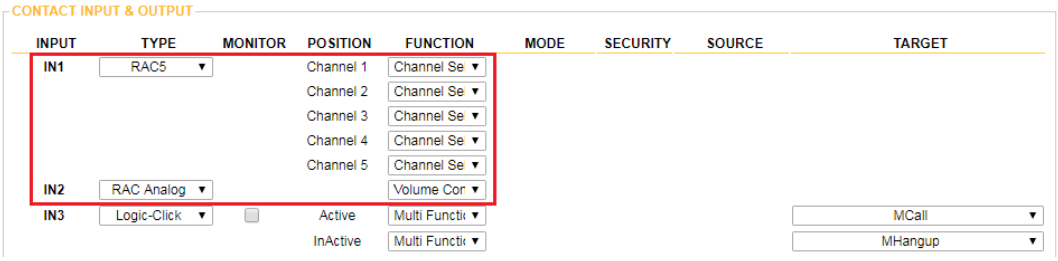


Figure 1

IN1 indicates as the contact input channel 1 on the rear panel of TERRA-SAP.

2. Go to [Audio Matrix] window:

   2.1) Select: Assign [IN1] as RAC 5 source selector, and set the five steps of RAC 5 from [SELECT] drop-down box (incl. the sources from NET1).

   2.2) Level (dB): Assign [IN2] as RAC's level control knob, and set either a fixed level or control the level by the knob of RAC 5 from [LEVEL] drop-down box.

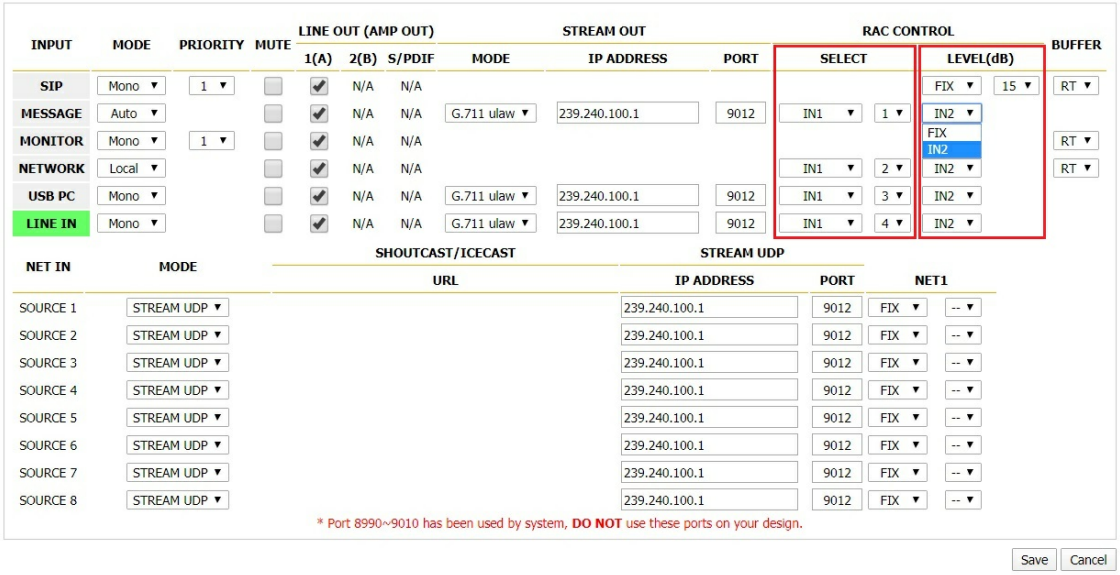
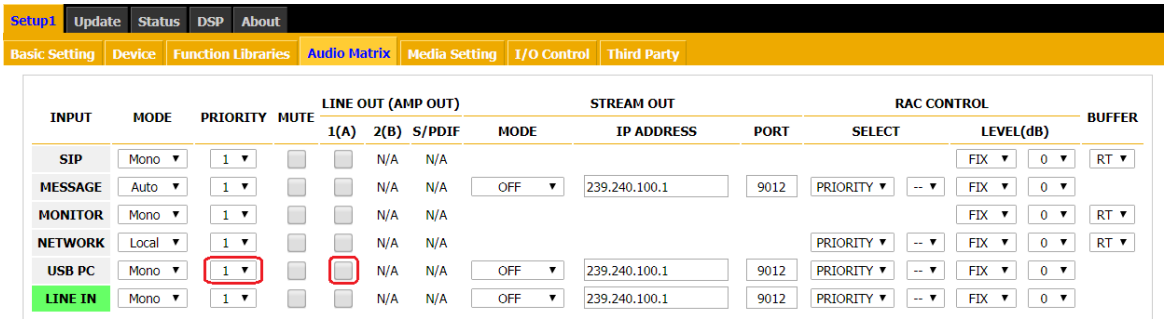


Figure 2

4.6.4.2 How-to: Remote Conferencing

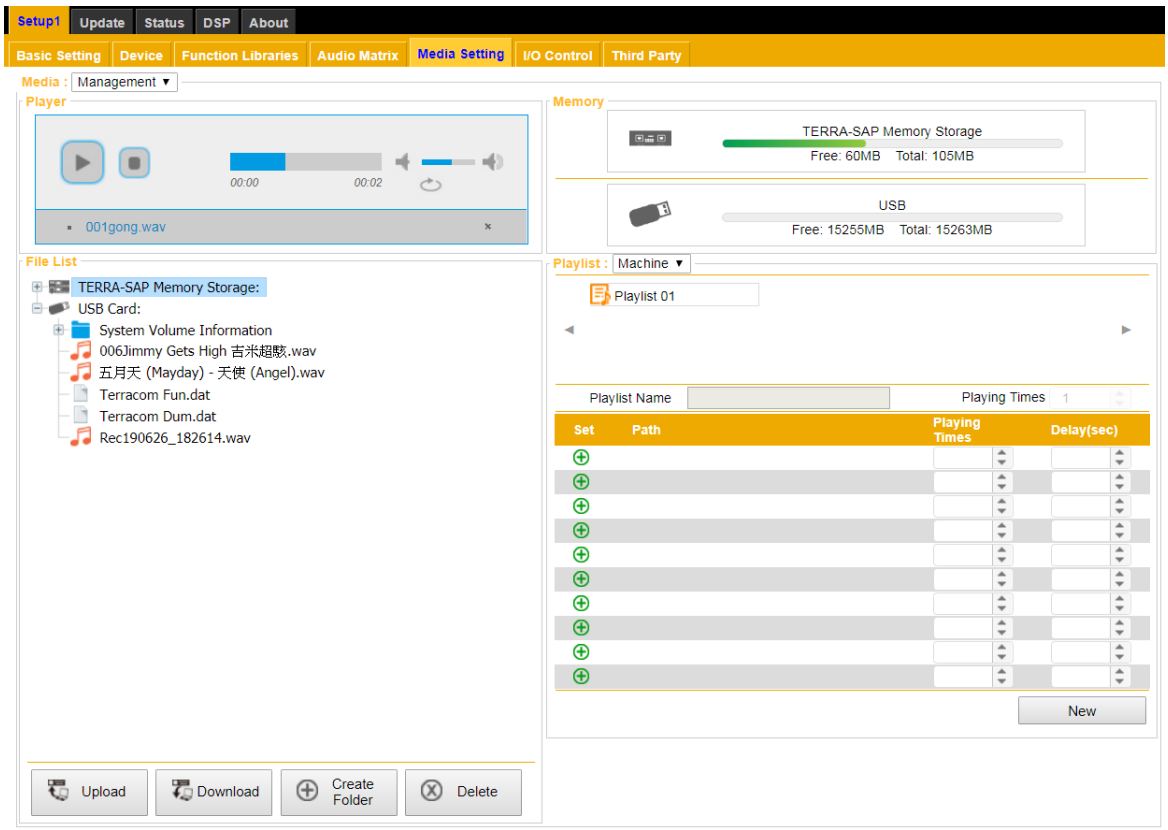
1. Connect the mini-USB interface of TERRA-SAP to PC/laptop.
2. Go to [Audio Matrix] window, and set the priority of USB PC input higher, so that it can use the audio output channels.
3. Enable [1(A)] checkbox of Line Out channel on USB PC input.



4.6.5 Media setting

4.6.5.1 Management

Display all the message files stored in the TERRA-SAP or USB flash drive.

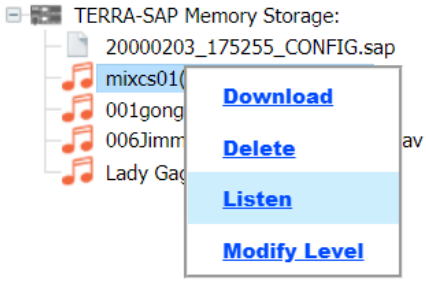


If you wish to auto play the playlist after stored the playlist setting, remember to set the priority of USB input right after the SIP input at [Audio Matrix] window, so that the playlist will be auto played after stored the settings in Media Setting window.

❖Player

- Preview the audio file on your PC:

1. Select an audio file on File List, and right click the audio file, then click [Listen], see the picture on the right.
2. And the audio file will be played automatically on [Player] window.



Symbol	Function
	Play
	Stop
	Repeat
	Volume adjustment
	Click to mute, click to unmute
	Display the current audio file which is selected from the File List.
	Remove the audio file from Player

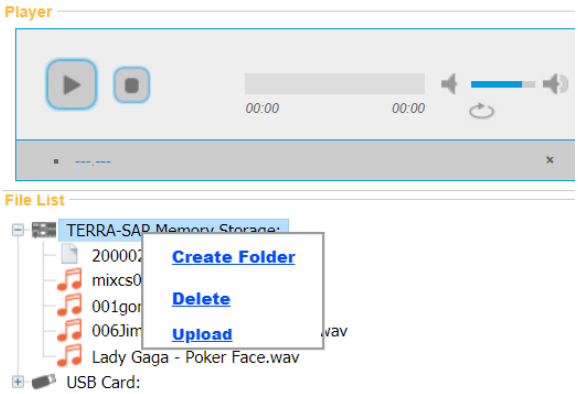
❖ File List

- TERRA-SAP storage memory: List all the files which are stored in TERRA-SAP.
- USB: List all the files which are stored in the external USB flash drive (format FAT32).

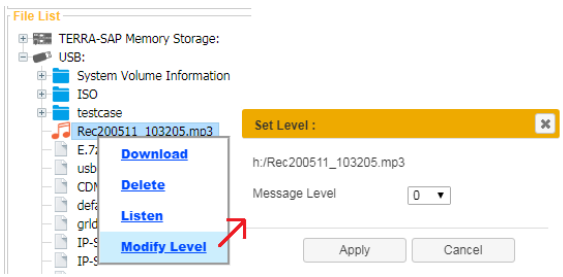
When the USB flash drive is connected to TERRA-SAP, it will automatically detect its file folder, and the files can be saved into playlist.

- Upload: Upload an audio file under the selected folder.
- Download: Select the audio file and click this [Download] button to download it.
- Create folder: Create a new folder under the selected folder.
- Delete folder/file: Select the folder/file on the list, and click this button to delete it.

You can also right click [TERRA-SAP Memory Storage] or [USB] option to create/ delete the folder and download/upload the file, see the picture below.



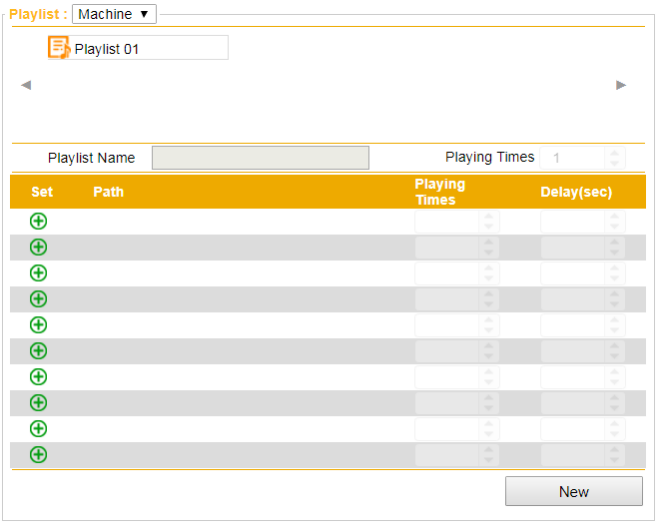
To modify the level of audio file, right click the file, then click [Modify Level] button to open a pop-up level setting window.



❖ Memory:

- Display the storage memory (max. 105 MB) of TERRA-SAP.
- Display the storage memory of the USB flash drive (format FAT32) connected to TERRA-SAP.

❖ Playlist



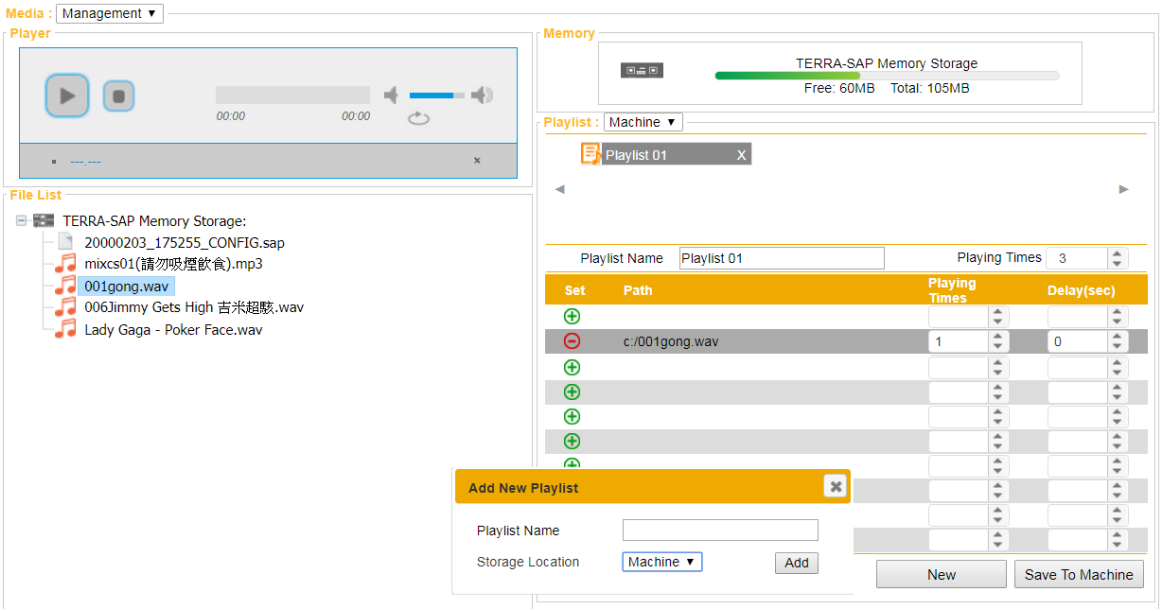
- Playlist name: Rename the selected playlist.
- Playing times: Set the playing times of the selected playlist. The range of playing times is from 1~65535, 65535 indicates to repeat the the playlist endlessly.
- Delay (sec): Set the delay time (sec) for each audio song. If the audio file is set as 5 seconds for delay time, it will delay 5 seconds before playing a next audio file.
- Add file into the playlist
- Remove file from the playlist
- Select the playlist
- New: Create a new playlist, and set the name and the storage location (Machine/USB) of this playlist.

❖ Example of creating a playlist

1) First, click [New] to create a new playlist.

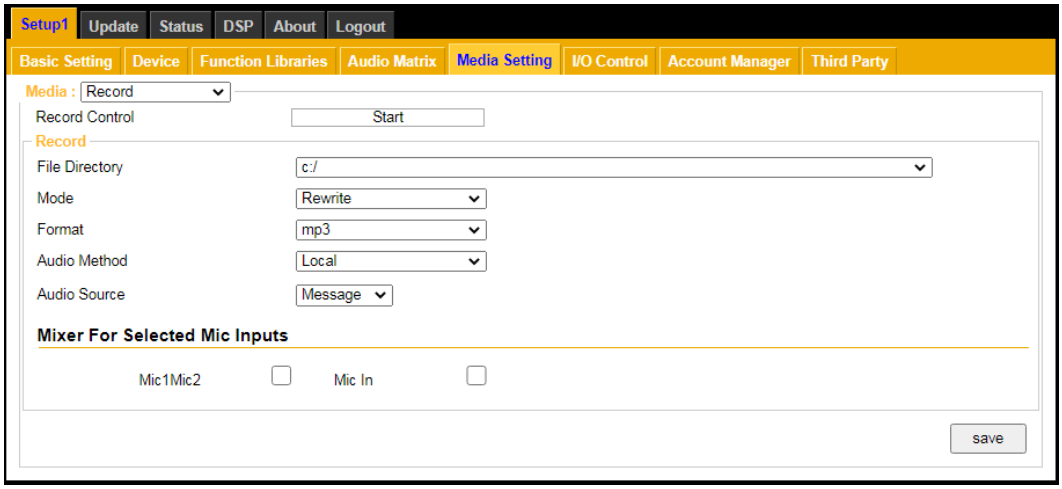
2) Select the audio file you want to have it on your list, the list is located on the left side of the window.

3) Then click ⊕ button to add the audio file in, click ⊖ button to remove it. And click [Save to Machine] button to complete the setting.



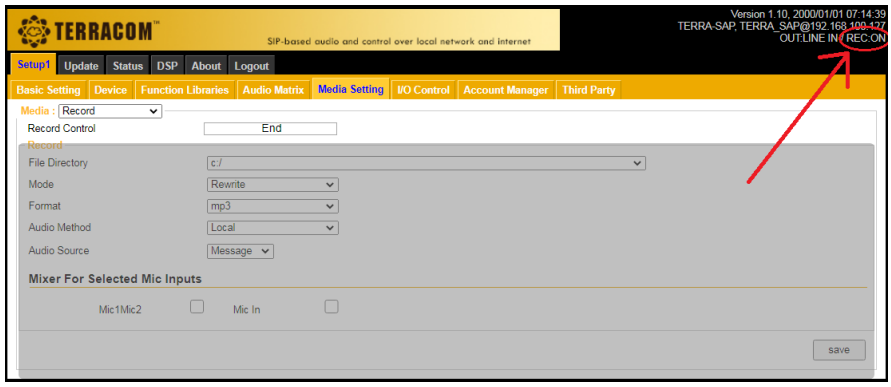
4.6.5.2 Record

Before operating the [Record] function using TERRA-SAP, please configure the basic recording settings in this webpage.



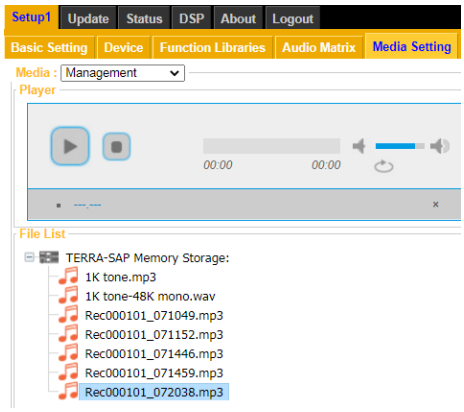
❖Record Control

- Start: Click this button to start recording. The [REC ON] status will be shown on the top-right corner during recording.



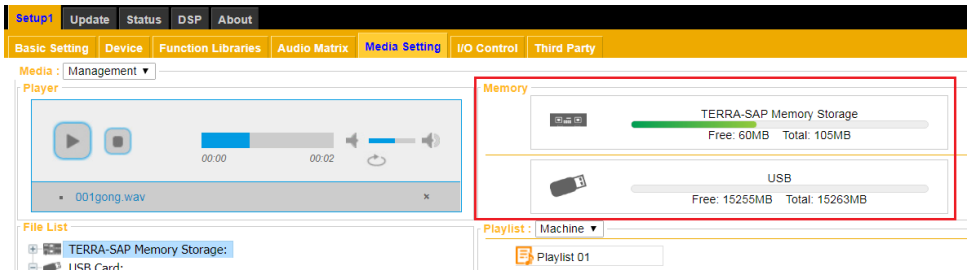
- End: Click this button to stop recording. Then the recorded file will be listed on Media Setting

> Management. See the picture as below.



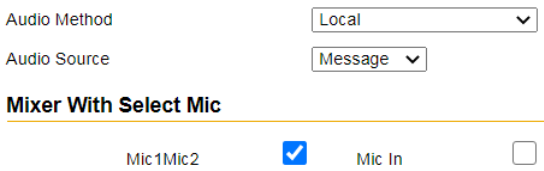
❖ Record

- File directory: The file path where the recorded files will be stored. You can see the current memory storage of TERRA-SAP/external USB flash drive on Media Setting > Management, see the picture as below.



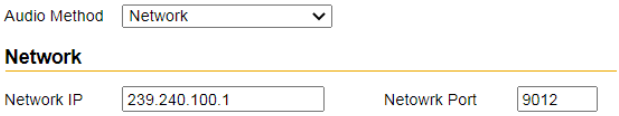
[Media Setting > Management] window

- Mode: When the memory storage is not enough, choose either [Rewrite] or [Stop] mode.
  - Rewrite: Rewrite the file from the first recorded file when the memory storage is full. If there are no other recorded files which can be deleted, the recording will be stopped.
  - Stop: Stop recording if the memory storage is full.
- Format: Choose which audio codec (Wav or MP3) the recorded file will be saved as.
- Audio method: Choose the audio source of recorded file either from [Local TERRA-SAP] or from [Network].
  - Local: Select the audio source (SIP, MESSAGE, LINE IN, USB PC etc.) which user wishes to record from the local TERRA-SAP device.



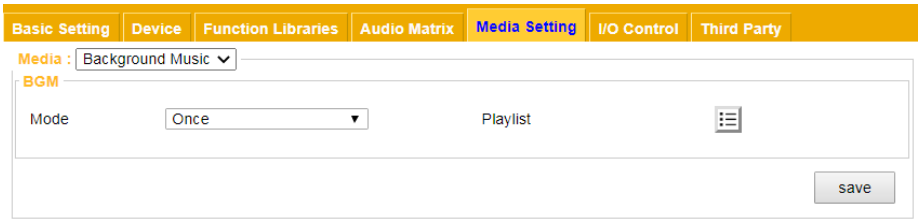
Source from Local TERRA-SAP

  - Mixer for Selected Mic Inputs: Record the audio from the chosen mic source(s).
    - Mic1Mic2: The Mic 1/Mic 2 audio input of TERRA-SAP device.
    - Mic In: The Mic 1/Mic 2/Mic 3 (Phoenix) of TERRA-SAP device.
  - Network: Record the audio source from the network. Please set the [Network IP address] and [Network Port].



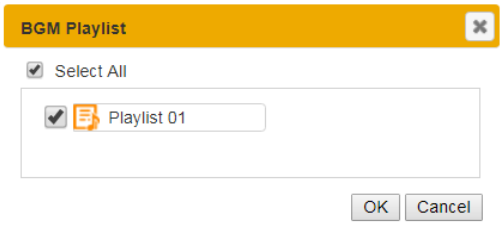
Source from Network

4.6.5.3 Background Music

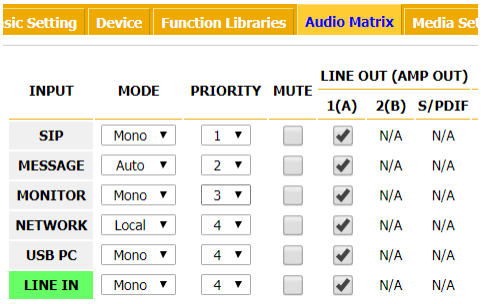


- Mode: The play mode of playlist.
  - Once: Play all the audio files which are added in [Playlist] setting once.
  - Repeat All: Play the audio files which are added in [Playlist] setting repeatedly in order.
  - Shuffle: Play the audio files which are added in [Playlist] setting randomly.
- Playlist: Click to choose the playlist(s) you wish to be played.

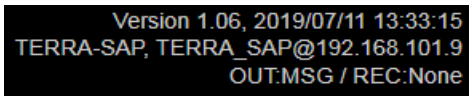
1. Tick the checkbox of the playlist(s) you wish to be played.



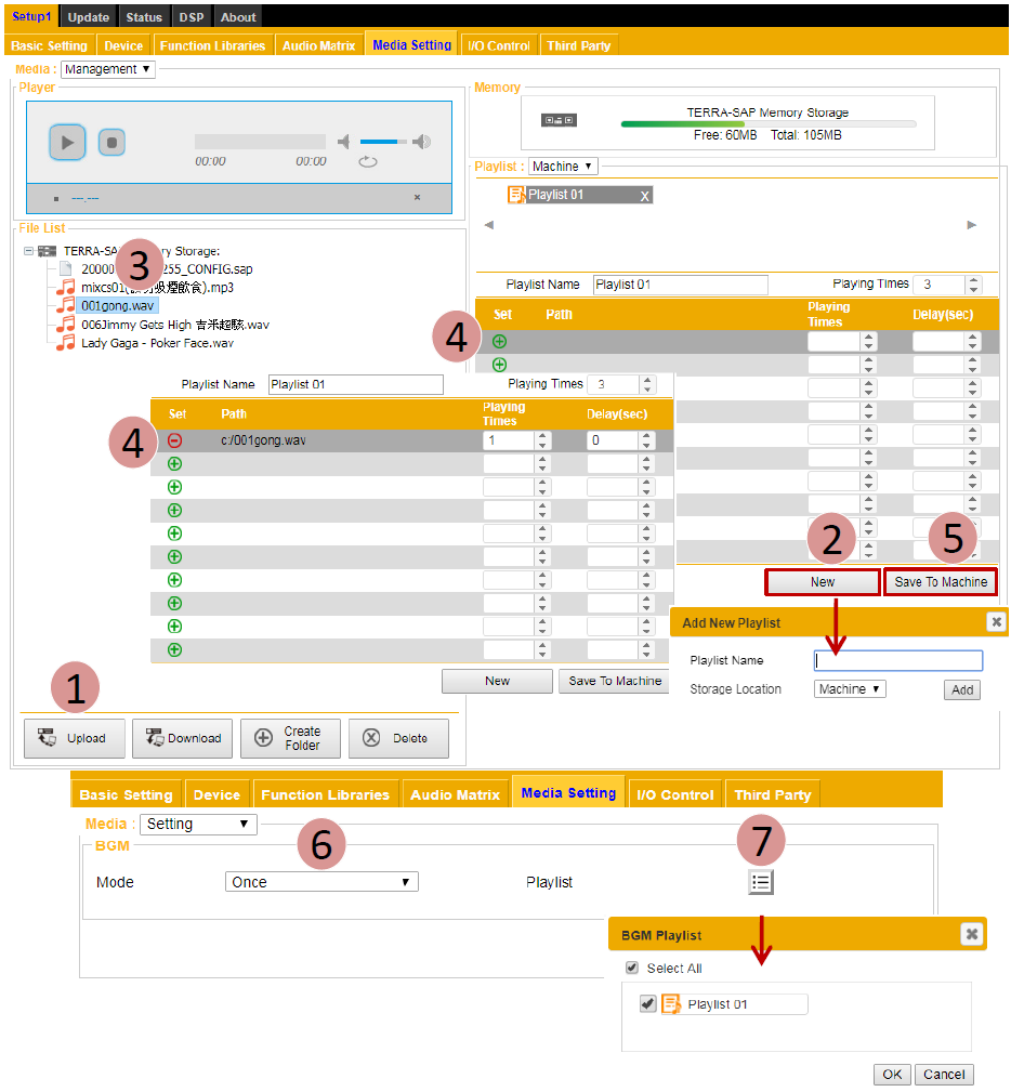
2. Please go to [Audio Matrix] window, and set the priority of MESSAGE Input higher than LINE IN, MONITOR, USB PC and NETWORK.



3. If the playlist has been played successfully, the information of OUT (Output) will display as MSG (MESSAGE INPUT) on the top right corner.

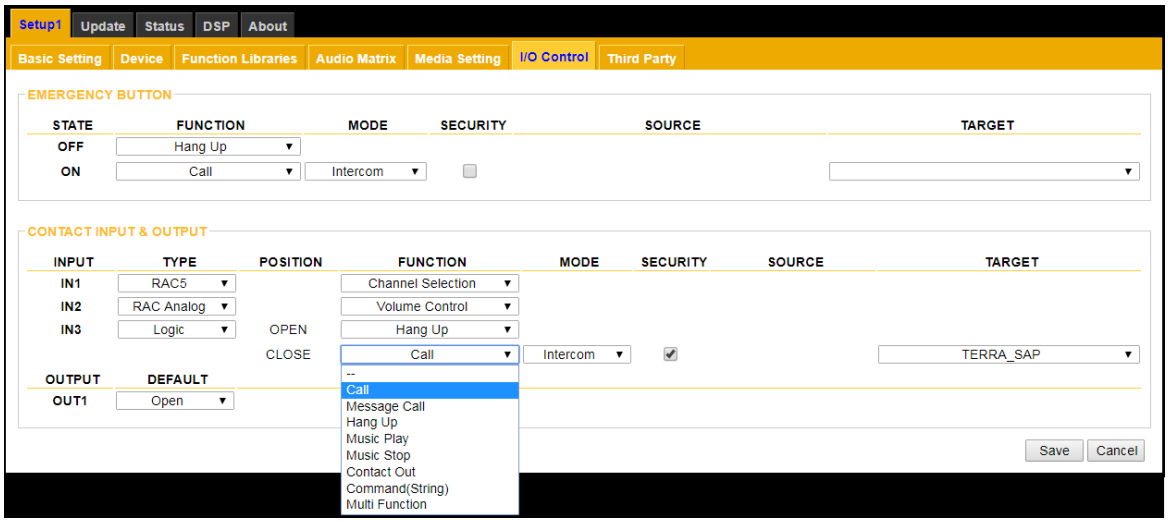


4.6.5.4 How-to: Add audio files and create playlists for BGM playing



1. Click [Upload] to browse an audio file, and upload it into TERRA-SAP.
2. To create a new playlist, click [New] to add a new playlist first.
3. Select the audio file you want to have it on your list, the list is located on the left side of the window.
4. Then click ⊕ button to add the audio file in, click ⊖ button to remove it.
5. Click [Save to Machine] button to complete the setting.
6. Choose the play mode (play once/repeat/random) and play target setting (internal/external/detect by external). For example, set [Repeat All] mode for BGM playing.
7. Click ☰ to choose one or multiple playlists as the BGM source.

4.6.6 I/O control



❖ **Emergency Button**

- State:
  - OFF: Trigger a Low to Hi (Release Trigger) action.
  - ON: Trigger a Hi to Low (Press trigger) action.
- Function: Select a function from the drop-down list, see the table as below.

Function
Call
Message Call
Hang Up
Music Play
Music Stop
Contact Out
Command (String)
Multi Function
Record

- Mode: Choose the calling mode (intercom/paging).
- Security: If the [Security] option is enable, the caller cannot hang up the call during paging unless the call receiver cancels the call itself.
- Source (Music Play/Music stop only): Choose a playlist which you've created on Setup 1 > Media Setting.
- Target: Choose a TERRACOM device to paging/SIP intercom, play message etc., or it can act as a Start action/Stop action for recording.

❖ **Contact Input**

- Input: The contact input which will be used for triggering an action, IN1 means contact input channel 1.
- Type: Choose the type of interface which will be used for controlling the action, including logic and remote device (RAC 5/8, RAC Analog).
- Position:
  - OPEN: Trigger a Low to Hi (Release Trigger) action.
  - CLOSE: Trigger a Hi to Low (Press trigger) action.

- Function: Select a function from the drop-down list, see the table as below.

Function
Call
Message Call
Hang Up
Music Play
Music Stop
Contact Out
Command (String)
Multi Function
Logic-Click
Music Selection & Music Stop (RAC)
Channel Selection (RAC)
RAC Analog (RAC)
Record

❖ **Contact Output**

- Output: The relay contact output of TERRA-SAP, it can be programmed to open or close the contact to an external device.
- Default: Set the default state (open or close) of logic relay outputs after the TERRA-SAP is powered.

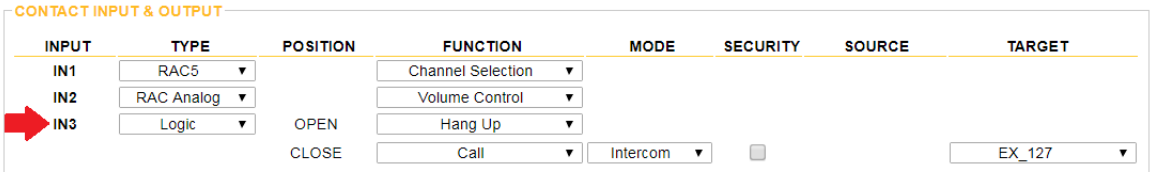
4.6.6.1 Call/Hang Up

❖ Call (Intercom/Paging)

Proceed intercom or paging call by using the connected LINE IN source on TERRA-SAP to a chosen TERRACOM device target when pressing (activated) the red EVAC button on the front panel of TERRA-SAP or the call button which is connected to the contact input of TERRA-SAP (IN1 means contact input channel 1).

❖ Hang Up

Hang up the intercom or paging call by pressing the emergency button on the front panel of TERRA-SAP or the connected button again to cancel intercom or paging.

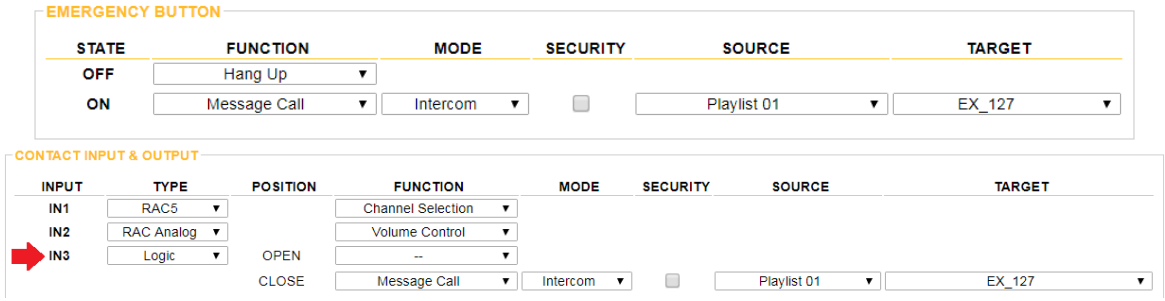


- Mode: Choose the calling mode (intercom/paging).
- Security: If the [Security] option is enable, the caller cannot hang up the call during paging unless the call receiver cancels the call itself.

4.6.6.2 Message Call

The Message Call action allows to play the messages directly to a chosen TERRACOM device target when pressing (activated) the red EVAC button on the front panel of TERRA-SAP or the call button which is connected to the contact input of TERRA-SAP (IN1 means contact input channel 1).

Press the connected button again to stop the message playing.

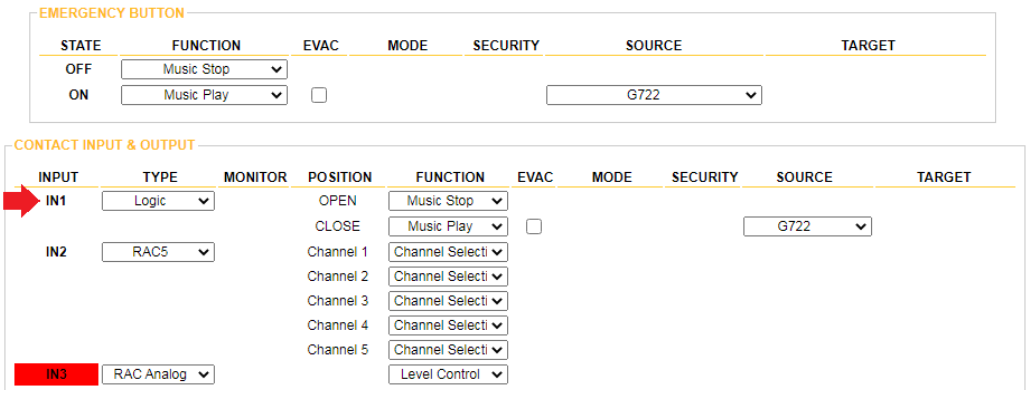


- Source: Select the playlist source which you have created on Setup_1_>_Media_Setting_>_Management.

4.6.6.3 Music Play/Stop

Play the music playlist (ON-state action) when pressing (activated) the red EVAC button on the front panel of TERRA-SAP or the call button which is connected to the contact input of TERRA-SAP (IN1 means contact input channel 1).

Press the emergency button on the front panel of TERRA-SAP or the connected button again to stop the message playing.

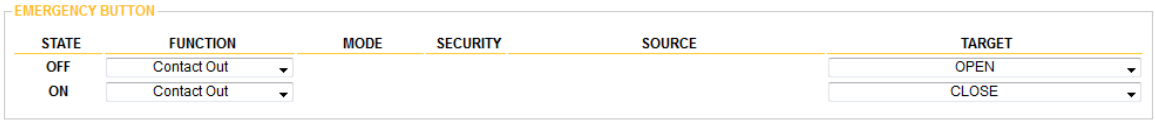


- Music Play: Play the music based on the playlist source.
- Music Stop: Stop the music playing.
- Source: Select the playlist source which you have created on Setup_1_>_Media_Setting_>_Management.
- EVAC: When the [EVAC] option of Emergency Button and Contact IN1~3 is enabled, the TerraManager software will show the source name (either Emergency Button or Contact IN1~3) on Monitor window > EVAC tab > Status grid. In addition, when the TERRA-SAP is proceeding multiple EVAC paging, **ONLY** the latest EVAC call will be displayed on the EVAC tab of TerraManager software.

When playing the music playlist via the red EVAC button on TERRA-SAP, the [Music Play] function can **ONLY** be canceled via the red EVAC button. As well as the 2-state button which is connected to the contact input1~3 of TERRA-SAP, when the [Music Play] function is triggered, this function can **ONLY** be canceled via the connected 2-state button.

4.6.6.4 Contact Out

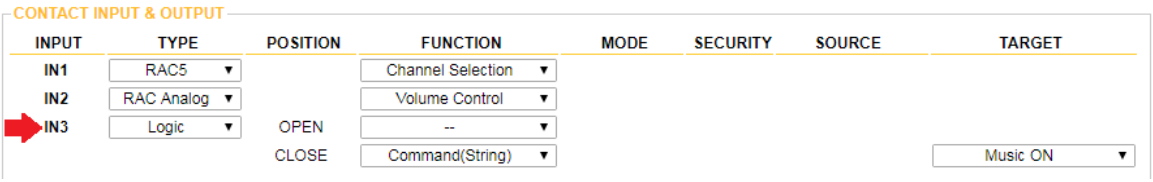
Program to control the external device by using the target you set on Setup_1_>_Function_Libraries_>_Contact_Out via the 1 channel contact output of TERRA-SAP.



Make sure the hardware wiring between the contact output of TERRA-SAP and external amplifier such as fire alarm is connected.

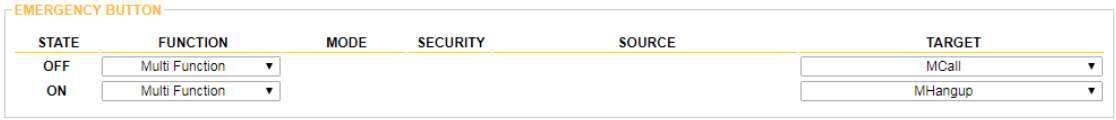
4.6.6.5 Command (String)

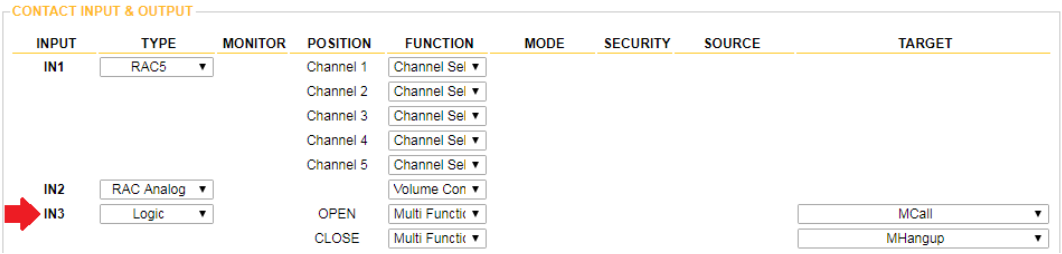
Send the 3rd party command (string) to the external device using the target you set on Setup 1 > Function Libraries > Command (String) via the contact input and the emergency button of TERRA-SAP.



4.6.6.6 Multi Function

Trigger the Multi Function action (a group of action with multiple functions) using the target you set on Setup 1 > Function Libraries > Multi Function via the relay contact output of TERRA-SAP.

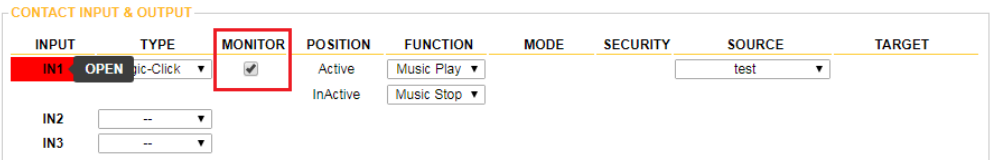




4.6.6.7 Logic-Click

The control inputs of TERRA-SAP can work with simple contact such as EVC-SW01W/EVC-SW02W emergency call button or other two-state button. For example, once the control input is connected to the two-state ON/OFF button, press the button to play the audio source (playlist), then press this button again to stop playing the audio source.

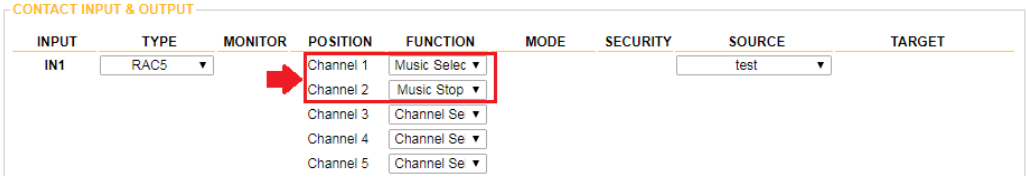
- Monitor: Once enabled, the open/short circuit monitoring will be activated. If the two-state ON/OFF button is not connected to the contact input of TERRA-SAP, the [OPEN] status will be shown, see the picture as below.



- Position: Choose the corresponded functions when the contact input is under Active position / Inactive position.

4.6.6.8 Music Selection & Music Stop (RAC 5/8)

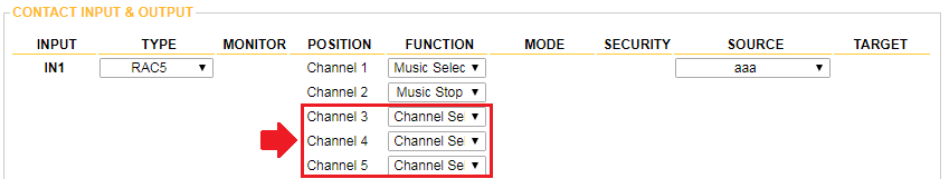
Assign a channel of RAC knob as [Music Selection] function, and use this function to quickly play an audio source (playlist) via RAC's knob. To stop playing the music, assign another channel of RAC knob as [Music Stop] function, and once switches to this knob position, the audio source shall be stopped.



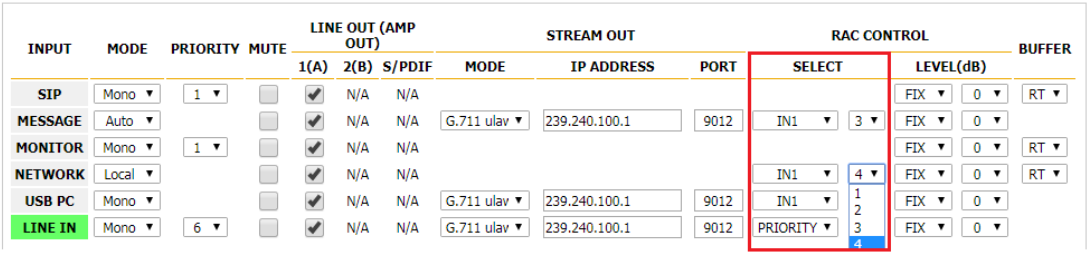
4.6.6.9 Channel Selection (RAC 5/8)

The RAC Channel Selection allows to switch the source channel of SIP / MESSAGE / MONITOR / NETWORK / USB PC / LINE IN input via RAC 5/8.

1. Go to [I/O Control] window, and choose a contact input channel (IN1 means contact input channel 1) for [RAC 5/RAC 8]. Then assign which channel knob(s) will be used for source channel selection.



2. Then go to [Audio Matrix] window, and set the same contact input channel and the corresponded source channel on [RAC Control] tab.

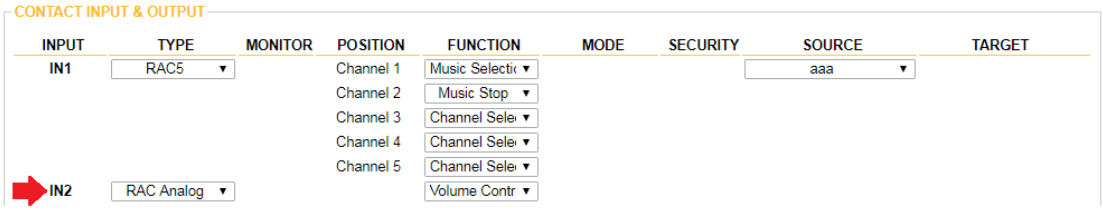


4.6.6.10 RAC Analog (RAC 5/8)

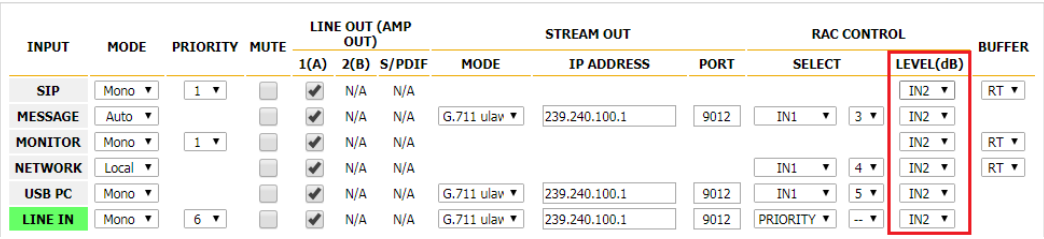
Allow to control the level of the audio source (SIP, MESSAGE, MONITOR, NETWORK, USB PC, LINE IN) which is currently playing.

1. Go to [I/O Control] window, and choose a contact input channel (IN1 means contact input channel 1) for [RAC Analog]. Then choose [Volume Control] function, allowing to control the level which is

currently playing via the level knob of RAC 5/RAC 8.



2. Go to [Audio Matrix] window, and set the same contact input channel on RAC Control > Level (dB).

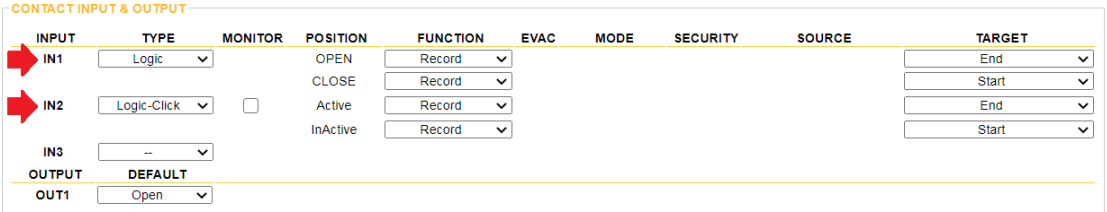


4.6.6.11 Record

Record the chosen audio source when pressing (activated) the red EVAC button on the front panel of TERRA-SAP or the 2-state call button which is connected to the contact input of TERRA-SAP (IN1 means contact input channel 1).

To stop the recording, press the emergency button on the front panel of TERRA-SAP or the connected 2-state button again.

The chosen audio source (SIP, MESSAGE, LINE IN, USB PC, NETWORK etc.) needs to be programmed on Media Setting > Record webpage first.

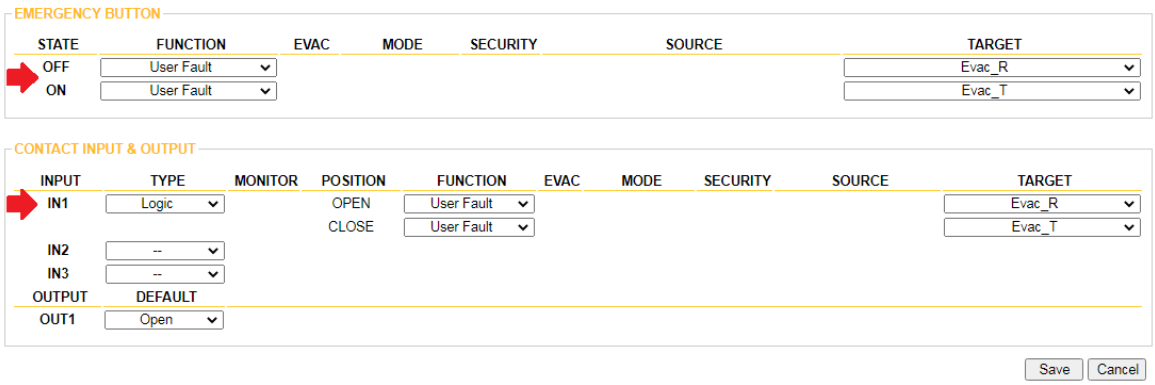


4.6.6.12 User Fault

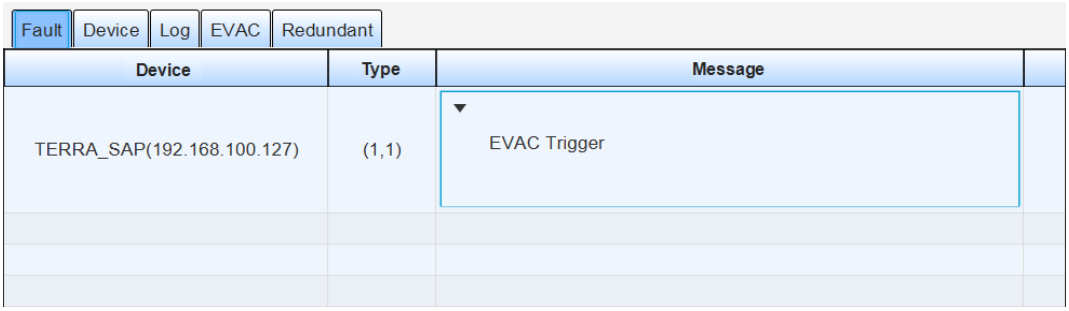
Assign the [User Fault] to an input source (EVAC button or Contact Input of TERRA-SAP), then select the trigger/release action from [Target] drop-down list.

The trigger/release action of [User Fault] needs to be configured on Setup 1 > Function Libraries > User Fault first.

Make sure the input source (EVAC button or Contact Input of TERRA-SAP) you set on [Function Libraries] window is matched with the settings on [I/O Control] window.

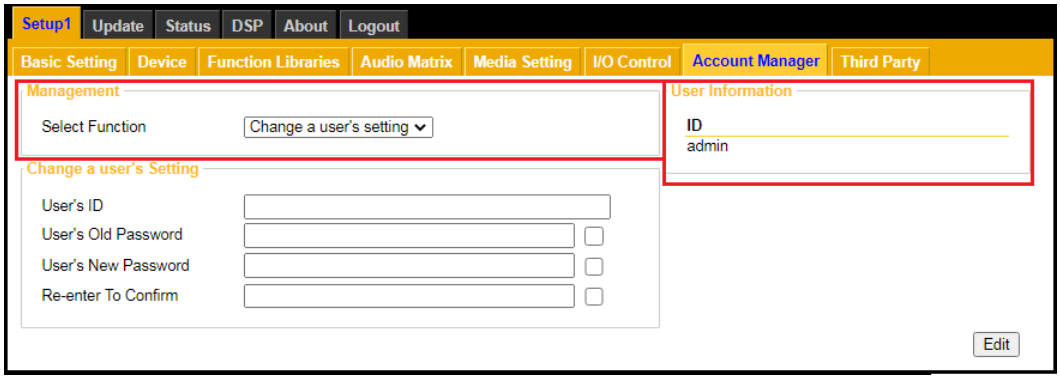


After completed the [User Fault] setting on [I/O control] window, when the fault is being triggered, it shall display on the [Monitor] window of TerraManager software, see the picture as below.



4.6.7 Account Manager

Except the [ADMIN] user ID, multiple sets of user ID can be created in [Account Manager] function, and have access to the TERRA-SAP web browser.



❖Management

- Add a user's ID
- Change a user's setting
- Delete a user's ID

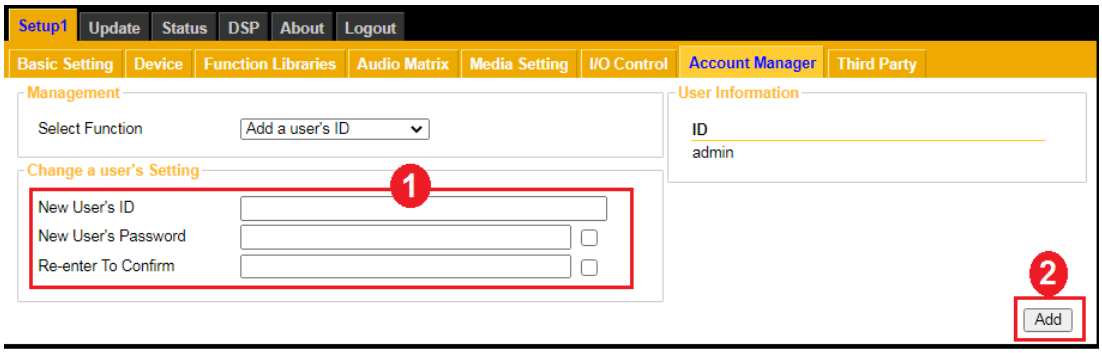
❖User Information

ID: Display the name of user ID.

Level: Display the authorization level of the user.

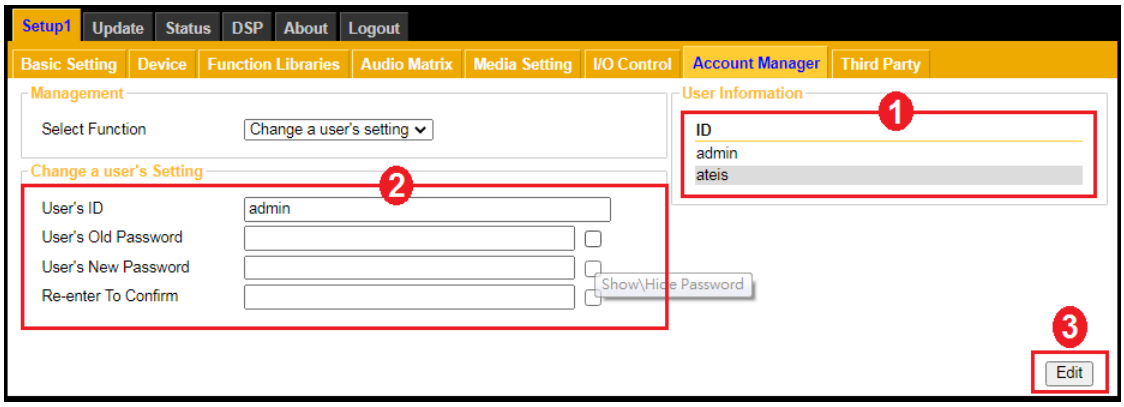
The default [User Name] is admin and its [Password] is admin. The admin user ID cannot be deleted, but its password can be user-defined.

4.6.7.1 Add a user's ID



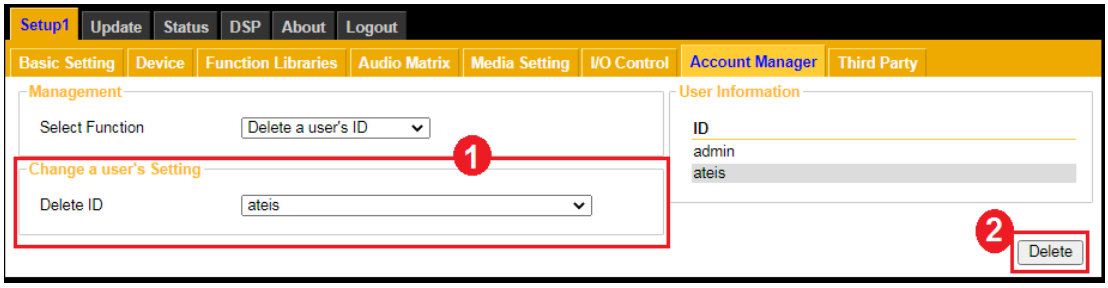
1. Enter the User ID and the password.
   - The password must contain at least one number or letter, and cannot leave blank on Password field.
   - Letters are case sensitive, and always filled in capital letters.
2. Click [Add] button.

4.6.7.2 Change a user's setting



1. Select the user ID first.
2. Modify the password.
3. Click [Edit] button.

4.6.7.3 Delete a user's ID

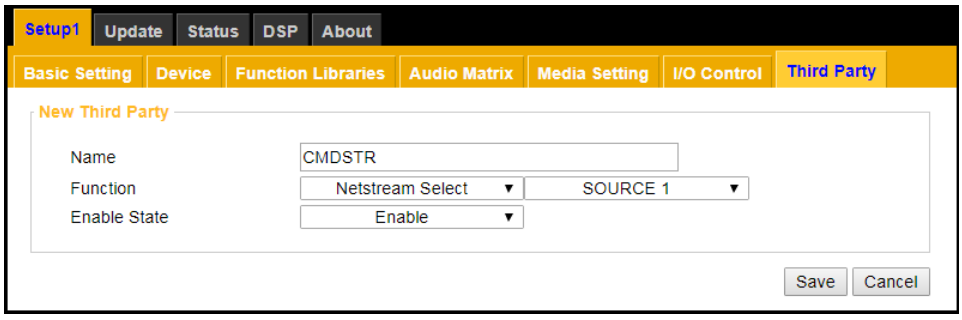


1. Select an user ID.
2. Click [Delete] button to delete it.

4.6.8 Third party

Set the 3rd party commend to allow other devices to control the TERRA-SAP.

Please enable [Network Controls Service settings] and set [+Network Port] on Steup1 > Basic Setting > Third Party Controls first.



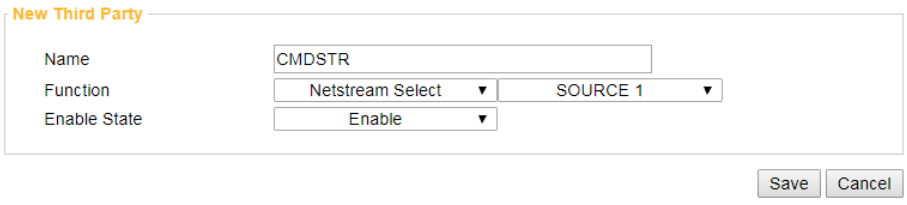
- Name: The [Name] field is the command string for triggering an action via 3rd party control.
- Function:

Interface		Function
Connection	Settings	
Ethernet (UDP)	UDP Port = 8010 (default)	• Bypass Control • Bypass Read • Mute Control • Mute Read • Level Control • Level Read • Netstream Select

- Enable State: To enable or disable this 3rd party command. If this field is set disable, the Terracom device will not execute the function even receives the command.

4.6.8.1 Netstream Select

Set the 3rd party commend, and choose to receive the network audio stream. Every Terracom device provides 8 sets of [NET SOURCE], the setting of every [NET SOURCE] can be configured on Setup1 > Audio Matrix.



- Command:

  To choose to receive which network (NET1 or NET2) and which audio stream source channel (1~8) in a quicker way, send string:n-c commend string behind the [Name] string.

Command	Meaning	Range
:n-c	n indicates the number of network (NET)	1~2
	c indicates the source channel	1~8

- Command - Netstream Select:

  From the example picture above, if you wish to receive the network audio stream, please send a commend string: CMDSTR. The TERRA-SAP device will send back in ASCII code as below.

- **200** (ASCII Code) indicates OK (received).
- **400** (ASCII Code) indicates NG (the 3rd party command sent from 3rd party device is not the same as [Name] field).

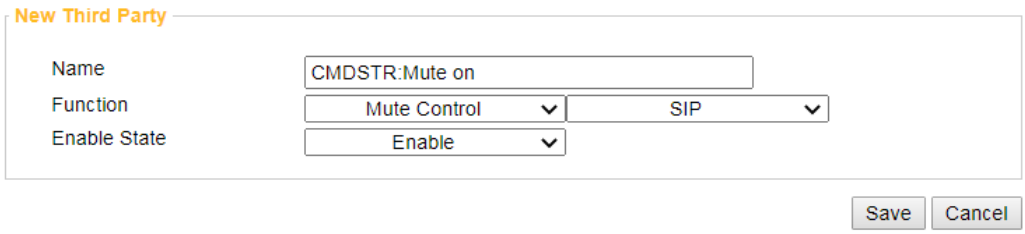
- Example:

  If users do not wish to send the 3rd party commend from [NET 1 SOURCE 1~8] and [NET 2 SOURCE 1~8] one by one, send string:n-c command string.

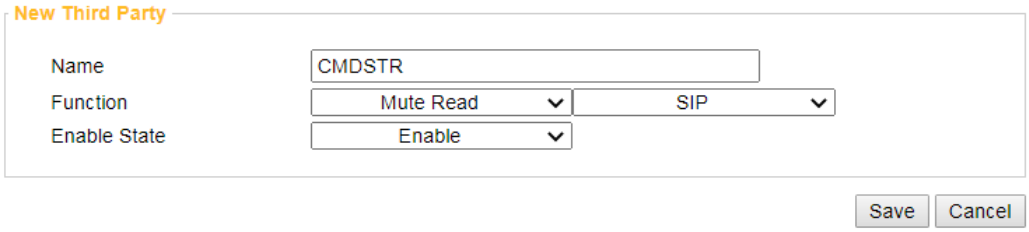
  1. Assume the value of Name is "TARGET".
  2. To choose to receive the [NET 2 SOURCE 7], the command string is TARGET:2-7.

4.6.8.2 Mute Control/Read

❖ Mute Control: Set the 3rd party commend to mute/unmute the audio source (SIP/MSG Player/ Monitor/Network/USB Receive/Line In/Mic1~Mic5/AMP Out/Line Out/USB Receive). The audio sources are located at Setup1 > Audio Matrix.



❖ Mute Read: Set the 3rd party commend to read back the mute/unmute status.



- **Example - Mute Control**

  Assume the value of Name is "TARGET".

  - There are 2 type of commands to mute on/mute off the SIP audio source.

    1. TARGET:Mute on --> The SIP source will change to [Mute on] status.
       TARGET:Mute off --> The SIP source will change to [Mute off] status.
    2. TARGET --> The SIP source will change to [Mute on] or [Mute off] (Toggle).
       If the current status is mute, the status will switch to unmute after received the 3rd party command. If the current status is unmute, the status will switch to mute after received the 3rd party command.

- **Example - Mute Read**

  Assume the value of Name is "TARGET".

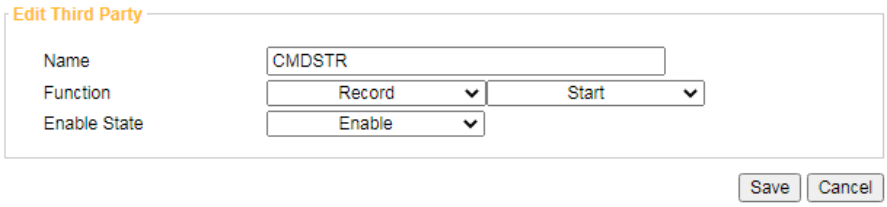
  - To read back the [Mute on] / [Mute off] status of SIP audio source:

    1. Select the SIP source from drop-down box. The command string is TARGET.
    2. Then the TERRA-SAP will reply TARGET:Mute ON or TARGET:Mute OFF.

4.6.8.3 Record

Set the 3rd party commend to record the chosen audio source (SIP, MESSAGE, LINE IN, USB PC, NETWORK etc.).

The chosen audio source needs to be programmed on Media Setting > Record webpage first.



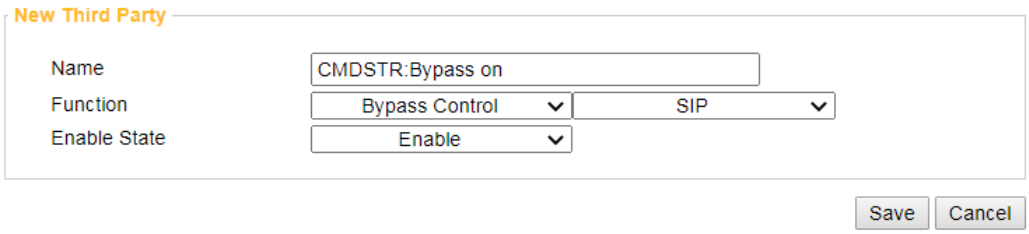
- Command - Record Start/Stop:

  From the example picture above, if you wish to record the chosen audio source, please send a commend string: CMDSTR. The TERRA-SAP device will send back in ASCII code as below.

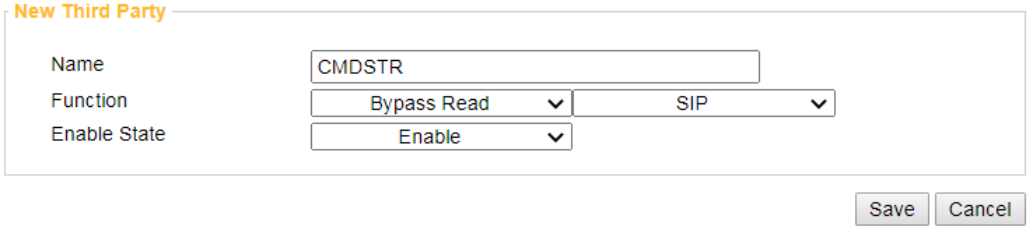
  - **200** (ASCII Code) indicates OK (received).
  - **400** (ASCII Code) indicates NG (the 3rd party command sent from 3rd party device is not the same as [Name] field).

4.6.8.4 Bypass Control/Read

❖ Bypass Control: Set the 3rd party commend to bypass the audio source. The source includes SIP, MSG Player, Monitor, Network, USB Receive, Line In, Mic1~Mic5, AMP Out, Line Out, USB Transmit, AGC-SIP, AGC-MSG Player, AGC-Monitor, AGC-Network, AGC-USB Receive, AGC-Line In, AGC-Mic 1, AGC-Mic 2.



❖ Bypass Read: Set the 3rd party commend to read back the [Bypass on] / [Bypass off] status of the audio source.



- **Example - Bypass Control**

  Assume the value of Name is "TARGET".

  - There are 2 type of commands to bypass on/bypass off the SIP audio source.

    1. TARGET:Bypass on --> The SIP source will change to [Bypass on] status.
       TARGET:Bypass off --> The SIP source will change to [Bypass off] status.
    2. TARGET --> The SIP source will change to [Bypass on] or [Bypass off] (Toggle).

If the current status of SIP source is non-bypass, the status will switch to bypass after received the 3rd party command. If the current status of SIP source is bypass, the status will switch to non-bypass after received the 3rd party command.

- **Example - Bypass Read**

  Assume the value of Name is "TARGET".

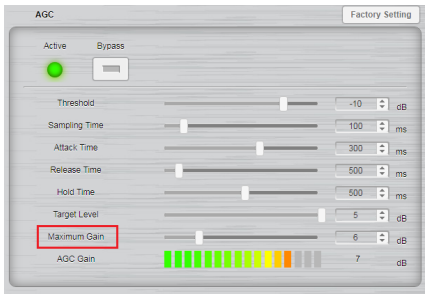
  ○ To read back the [Bypass on] / [Bypass off] status of SIP audio source:

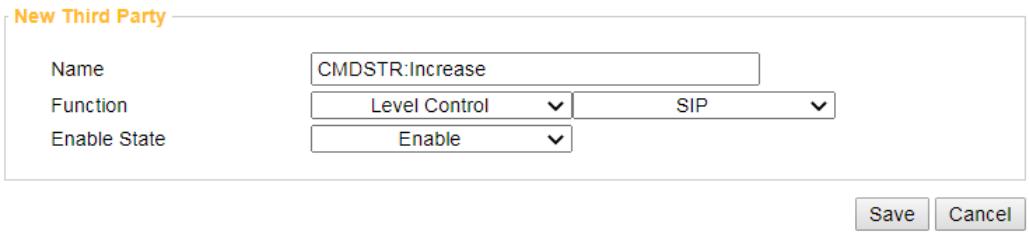
  1. Select the SIP source from drop-down box. The command string is TARGET.
  2. Then the TERRA-SAP will reply TARGET:Bypass ON or TARGET:Bypass OFF.

4.6.8.5 Level Control/Read

❖ Level Control: Set the 3rd party commend to adjust the level of audio source. The source includes SIP, MSG Player, Monitor, Network, USB Receive, Line In, Mic1~Mic5, AMP Out, Line Out, USB Transmit, AGC-SIP, AGC-MSG Player, AGC-Monitor, AGC-Network, AGC-USB Receive, AGC-Line In, AGC-Mic 1, AGC-Mic 2.

Please note the level control of AGC source refers to the [Maximum Gain] parameter on AGC component.





- Source Control & Range:

  The table below indicates all the audio sources and the corresponded adjustable range. There are 2 kinds of way to adjust the level:

  ○ Add [:Increase] or [:Decrease] command string, and the specific level range behind the listed source.

  ○ Add [:xx] command string, and the level of audio sources will be changed to the same level as the level on 3rd party command.

Source	Command	Level Range	Unit (dB)
SIP, MSG Player, Monitor, Network, USB Receive, Line In, Mic1~Mic5, USB Receive	:Increase :Decrease	-90dB ~ 20dB	1
	:xx (xx -> dB value)	-90dB ~ 20dB	1
	:Bypass on :Bypass off :Mute on :Mute off	-	-
AMP Out, Line Out, USB	:Increase	-90dB ~ 20dB	1

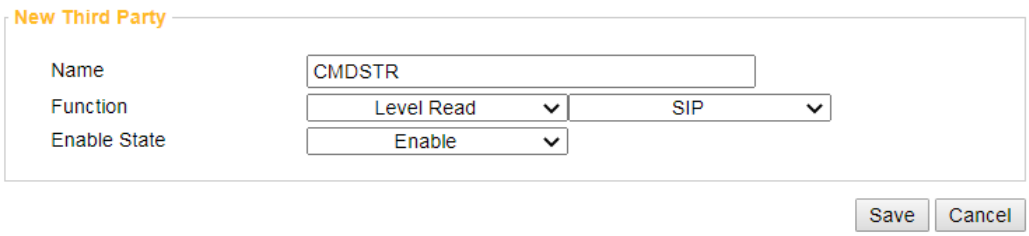
Source	Command	Level Range	Unit (dB)
Transmit	:Decrease		-
	:Bypass on :Bypass off :Mute on :Mute off	-	-
AGC-SIP, AGC-MSG Player, AGC-Monitor, AGC-Network, AGC-USB Receive, AGC-Line In, AGC-Mic 1, AGC-Mic 2	:Increase :Decrease	0dB ~ 30dB	1
	:Bypass on :Bypass off :Mute on :Mute off	-	-

- **Examples - Level Control**

  Assume the value of Name is "TARGET".

  - To increase 1dB level of MIC input, select MIC source from drop-down box. The command string is TARGET:Increase
  - To set the level of MIC input as 5dB, select MIC source from drop-down box. The command string is TARGET:5
  - To mute the Line Out output, select Line Out source from drop-down box. The command string is TARGET:Mute on
  - To bypass the AGC-SIP, select AGC SIP source from drop-down box. The command string is TARGET:Bypass on

❖ Level Read: Set the 3rd party commend to read back the level of audio source.



- **Example - Level Read**

  Assume the value of Name is "TARGET".

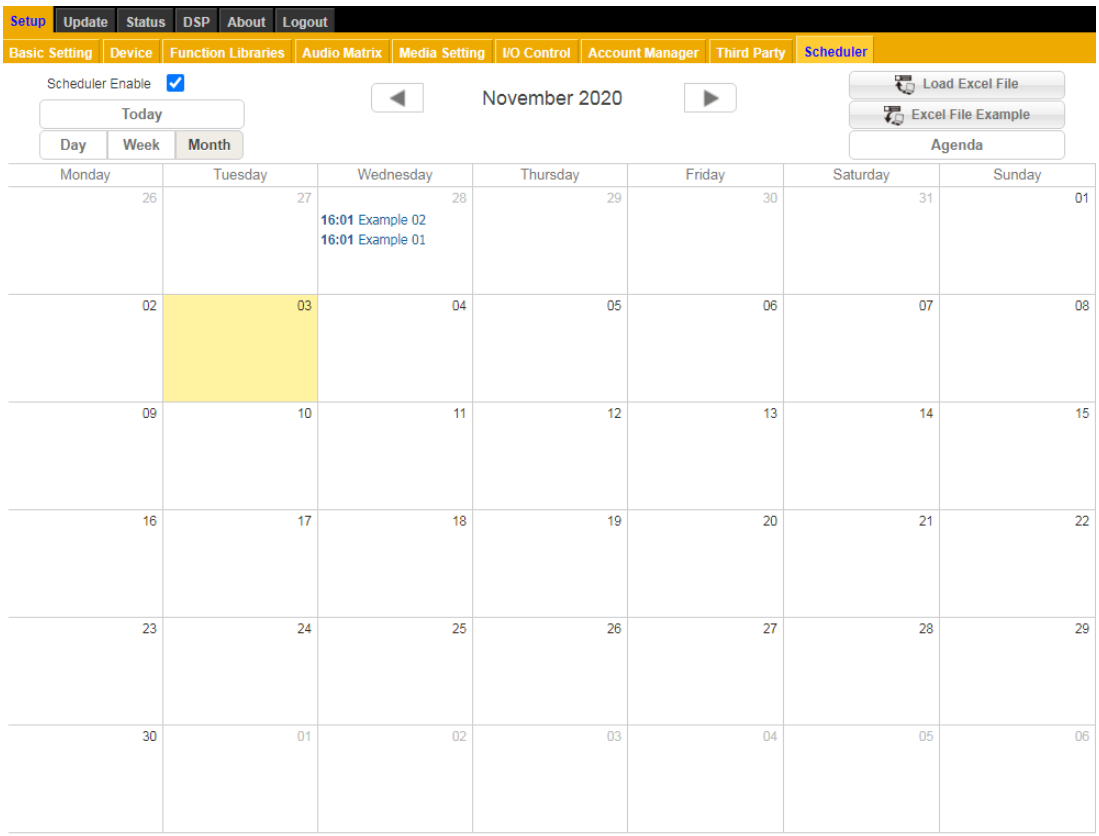
  - To read back the level of SIP audio source:

    1. Select the SIP source from drop-down box. The command string is TARGET.
    2. Then the TERRA-SAP will reply TARGET:Level xx. xx indicates as the current level of audio source.

If the audio source is currently being muted, the TERRA-SAP will still reply the current level of audio source to 3rd party device.

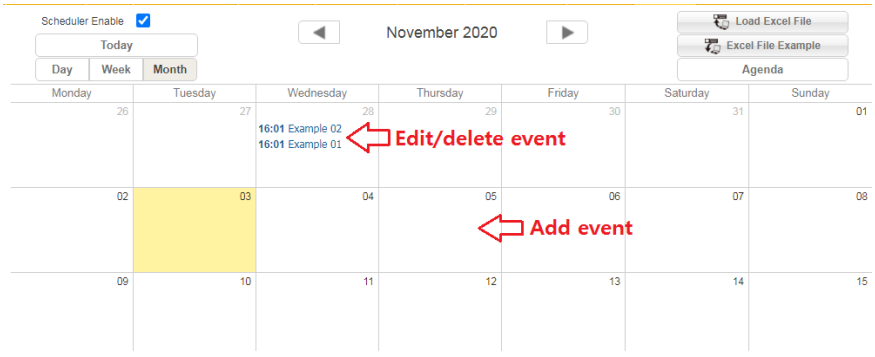
4.6.9 Scheduler

The Scheduler allows to schedule the events such as messages playing, commands triggering etc..



- Scheduler Enable: Tick this checkbox to enable the scheduler function.
- Today: Click to go back to the area which displays today's schedule.
- Day/Week/Month: Choose from the three types of display window template on scheduler. The default window is Month.
- Load Excel File: Click to load an excel sheet with the listed events you want to create on Scheduler.
- Excel File Example: Click to download the excel file of event examples. The listed events must be followed by the order on the excel sheet.
- Agenda: Switch to [Agenda] template for editing schedules.

4.6.9.1 Add/edit/delete



- Add: Double click the date you wish to add a event, then the Event window will be opened (see Figure 1).
- Edit: Double click the event you wish its parameters to be modified (see Figure 1).
- Delete: Double click the event you wish to delete first, and click [Delete] button on the Event window to delete it (see Figure 1).

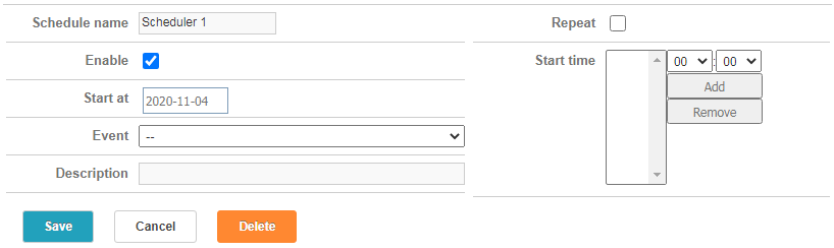
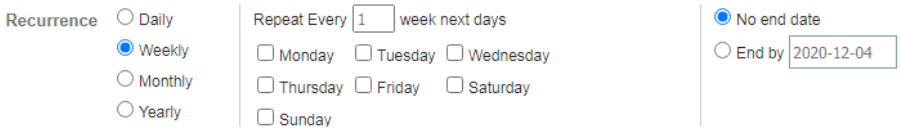


Figure 1

- Enable: Tick this checkbox to enable this event.
- Start at: Click the date to open a calendar window, and select a date to start this schedule
- Event: Display which event is affiliated to the schedule action, see Event for details.
- Description: Memo area.
- Repeat: Tick this checkbox to enable the [Recurrence] function (repeat event).
- Recurrence event: The event can be repeatable by daily, monthly, weekly and yearly.

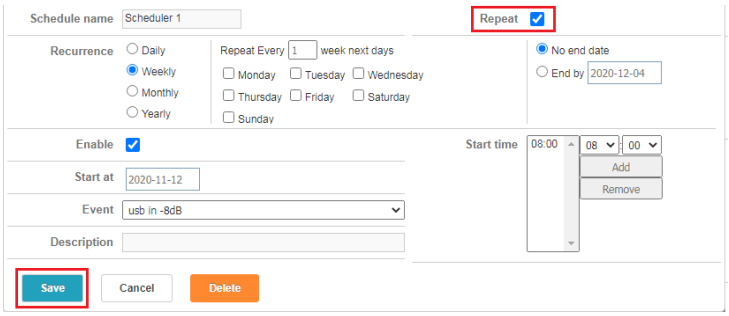


- Start Time: Add/remove the activation time. The format is HH:MM.

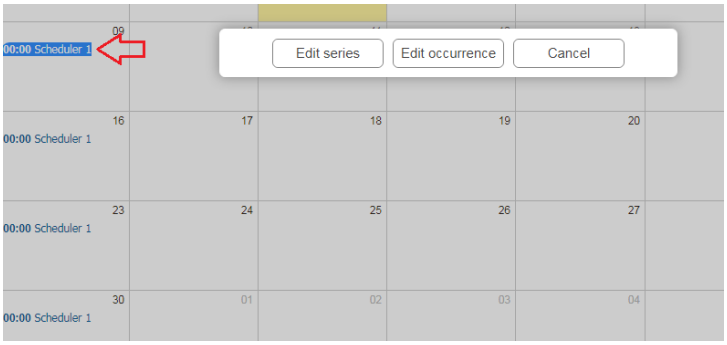
The criteria of the event name and description:
- Event name: Contain a max. number or letter of 40.
- Description: Contain a max. number or letter of 100.

4.6.9.2 Edit repeated event

Edit the date of the repeated event individually or edit in a whole set. See the steps below:



1. First, enable [Repeat] option on the event window, and click [Save] to save this schedule setting.
2. Double click this event on scheduler window again, it will pop-up a message window as the picture below. Here you can choose either to edit a series event or edit in occurrence.



- Edit. series: Edit the date of a series repeated event
- Edit occurrence: Edit the date with the selected event Individually.

4.7 Update

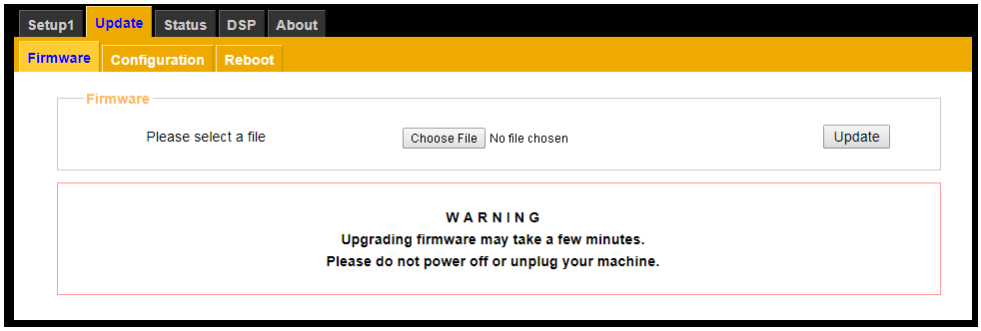
4.7.1 Firmware

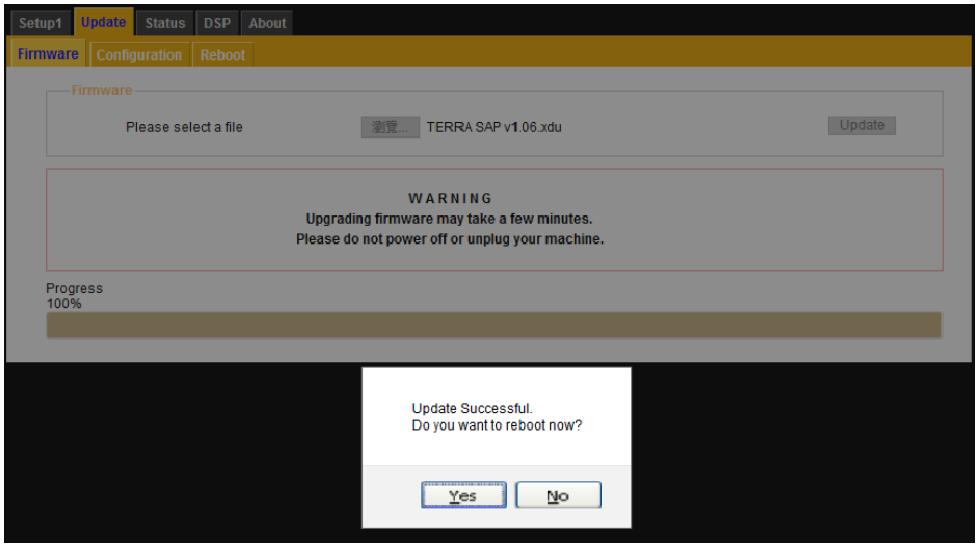
❖Update the TERRA-SAP firmware to the latest version. Follow the steps as below:

1. Click [Browse File...] button to choose the firmware path specified to the one corresponding to the TERRA-SAP device.
2. Click [Update] to proceed this action.
3. At last, click [Reboot] button to apply to the TERRA-SAP device.

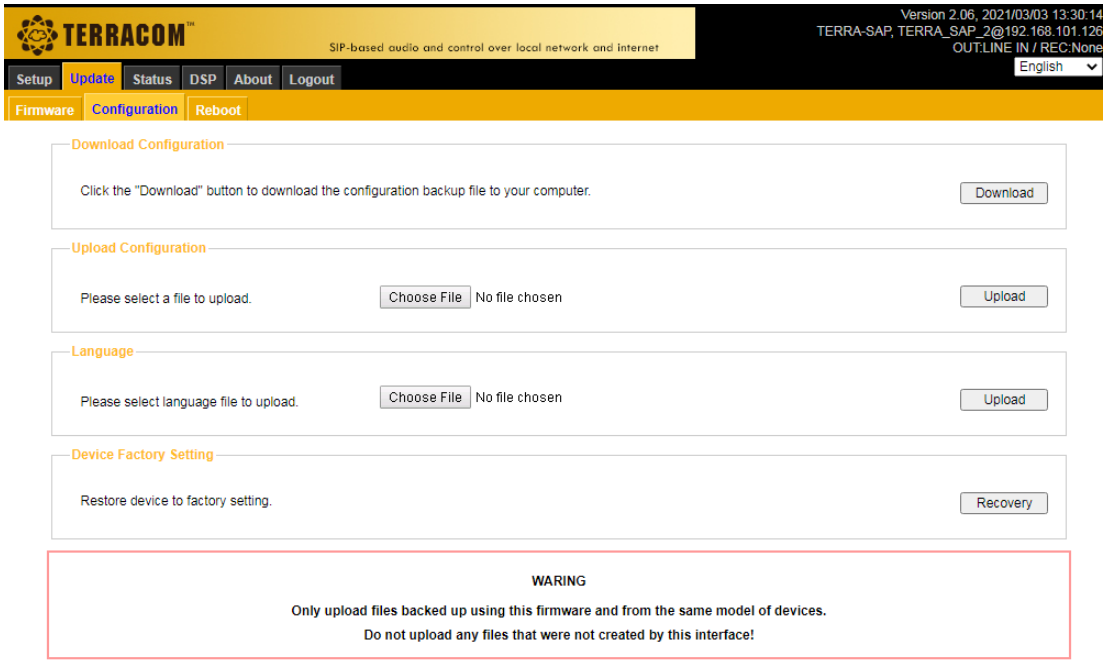
Please note the v2.xx firmware of TERRA-SAP **CANNOT** be downgraded to v1.xx firmware. The v1.xx firmware can be updated to v2.xx firmware.

When updating the firmware from v1.xx to v2.xx, the EVAC LED indicator on the front panel of TERRA-SAP will flash, and please don't turn off the TERRA-SAP during updating in case unexpected error occurs. The update time is about 80 seconds.





4.7.2 Configuration

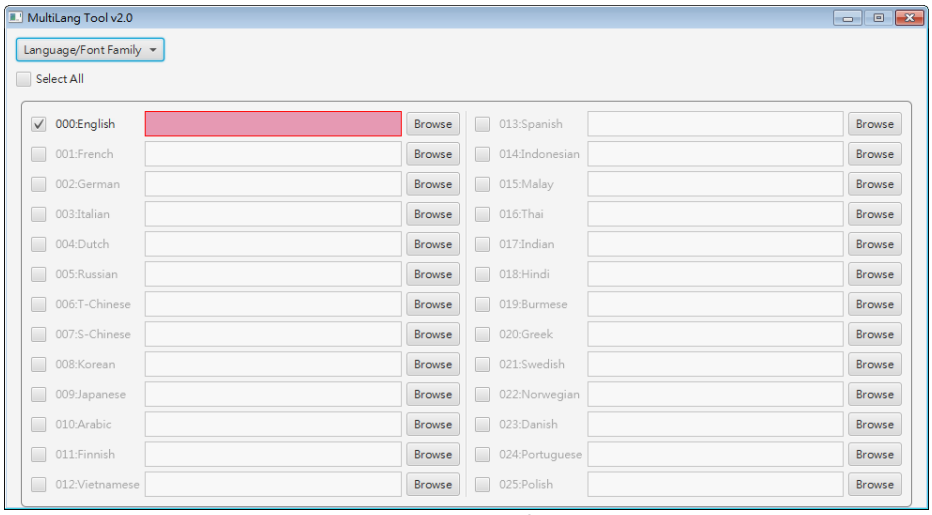


❖ Download Configuration: Click [Download] button to download the current configuration file to the selected path of PC/laptop.

❖ Upload Configuration: Click [Browse File...] button to choose a configuration file from the selected path of PC/laptop, then click [Upload] button to load this configuration file to TERRA-SAP device.

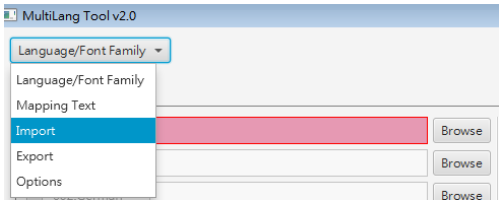
❖ Language: Support multi-language function on TERRA-SAP web browser.

1. Firstly, to create a custom language file (.lang), please Contact Us for the Multilang Tool software, this software allows your local sales to edit and translate the texts displayed on TERRA-SAP web browser, and export it in a .lang file (eg: Machine_Languages_V1.00.lang). See the following 4 steps to generate the custom language file as below.

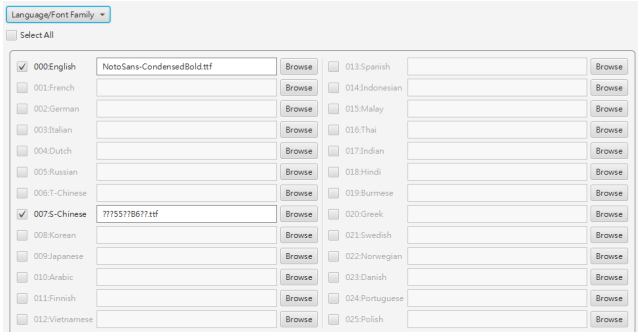


Multilang Tool software

- Step-1: Firstly, click [Import] button to import a .lang file (eg: Machine_Languages_V1.00.lang). This lang file shall be provided by Ateis Technical Team (see Contact Us).

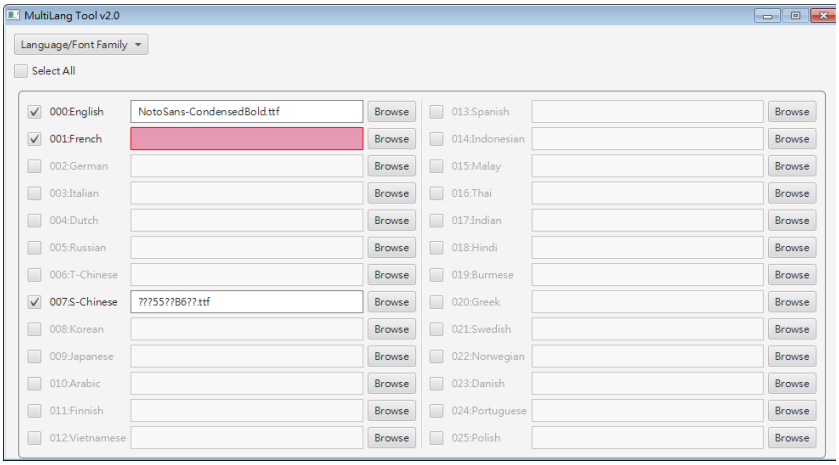


Import

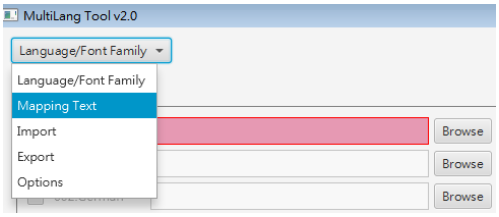


Display the current translated language

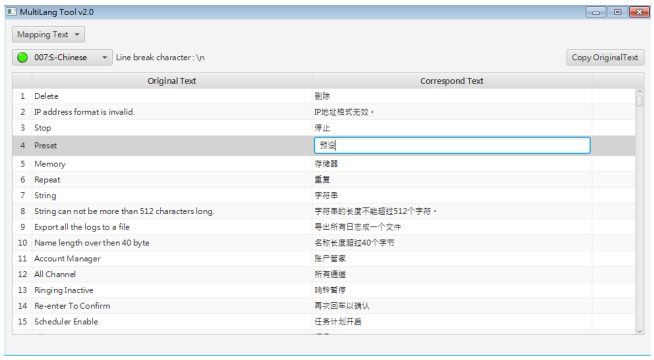
- Step-2: Select a language by ticking its checkbox. And click [Browse] button to choose a font from PC/laptop.



- Step-3: Then click [Mapping Text] button to edit and translate texts displayed on TERRA-SAP web browser.

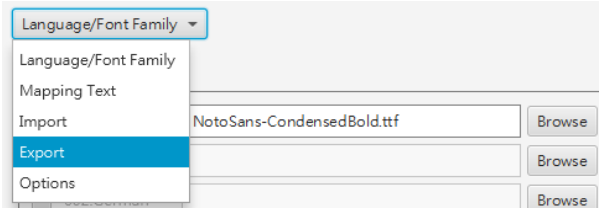


Mapping Text



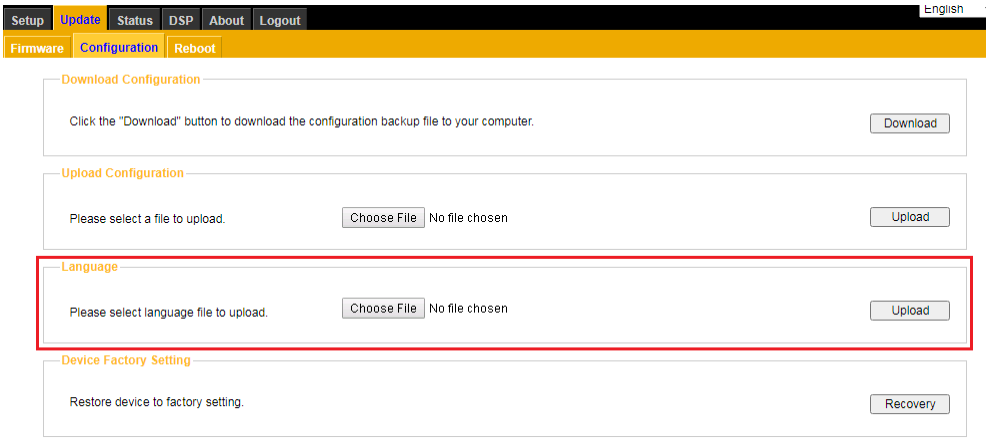
Edit the translate texts

- Step-4: Click [Export] button to export the .lang file, this .lang file shall include the translated texts users have edited in Multilang Tool software.

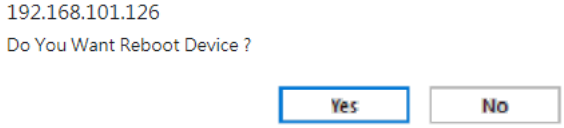


Export

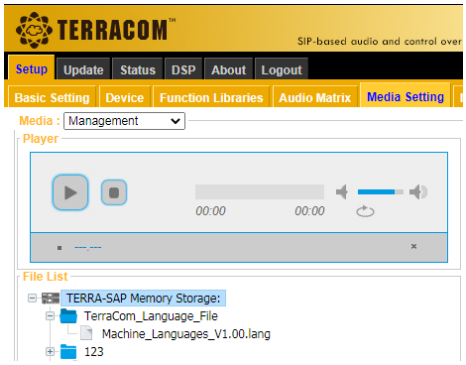
2. After exported the .lang file from Multilang Tool software, please go to TERRA-SAP web browser > Update window, and click [Choose File...] button on [Language Setting], then choose this lang file from the selected path of PC/laptop. After that, click [Upload] button to uploaded this lang file to TERRA-SAP and web browser.



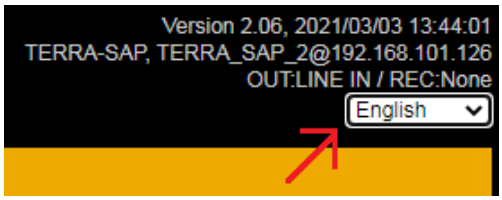
3. A [Reboot] pop-up window shall be displayed, click [Yes] button to reboot the TERRA-SAP and web browser.



The new language file (.lang) which the local sales or users have updated here will overwrite the default language file (.lang) stored in the TERRA-SAP.
Users can find th lang file from Setup1 > Media Setting > Management.



4. Then choose the language from the drop-down list located at the top-right corner on Menu window.



❖Device Factory Setting: Click [Recovery] button to restore the TERRA-SAP to factory setting.

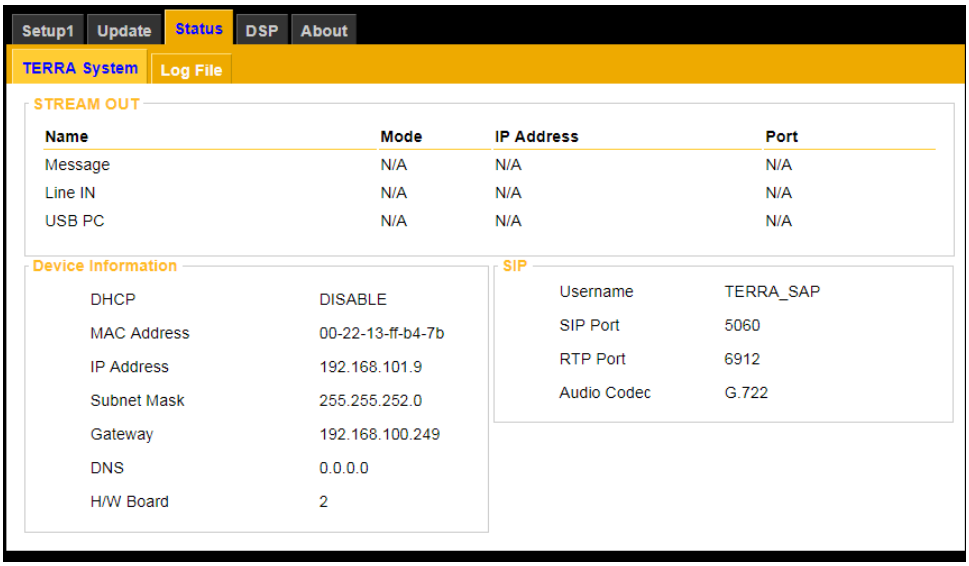
4.7.3 Reboot

Click [Reboot] to reboot the TERRA-SAP device.

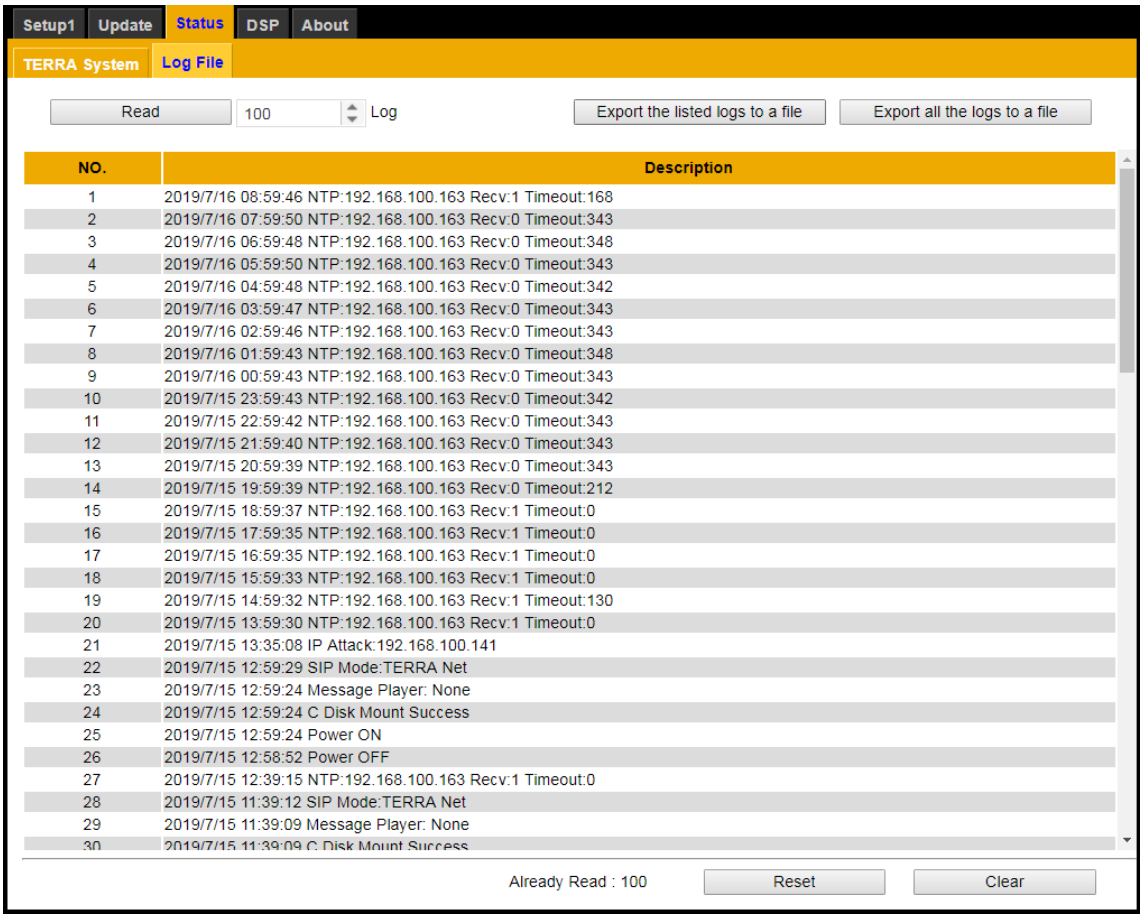
4.8 Status

4.8.1 TERRA System

Display the general information of the TERRA-SAP device.



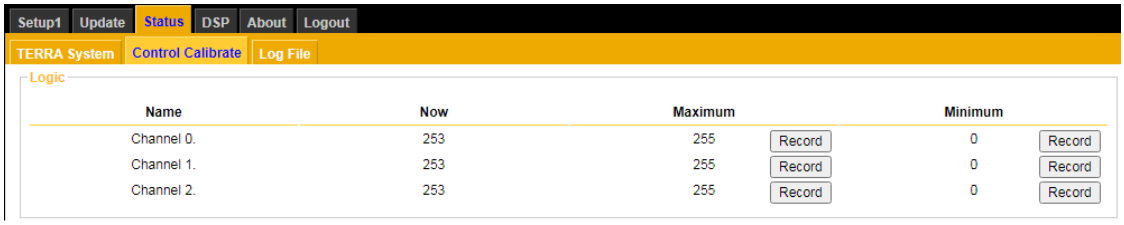
4.8.2 Log File



- Read: Click this button to read the logs of device. Click this button again to read the entries of log based on the setting on the right field. For example, if the setting of entries of log is 100, click [Read] button to read from 1 to 100 logs; click [Read] button again, then the list will show 1~200 logs on the list.
- Already read: List the total entries of log displayed on the window.
- Reset: Click this button to reset the log list. The [Already Read] log will also be reset.
- Clear: Click this button to clear the entries of log displayed on the window. The [Already Read] log will remain from the last [Read] count.
- Export the listed logs to a file: Export the device logs displayed on current log list to a text file.
- Export all the logs to a file: Export all the device logs to a text file.

4.8.3 Control Calibrate

❖Logic: Display the calibration result (value between 0~255) of contact input channel on TERRA-SAP, it is commonly used for a two-state push button or an analog knob on RAC 5/RAC 8.



❖RAC: The RAC 5/RAC 8 are the remotes which features the wall-mount volume display and source

selection for Terracom system. When the channel selection on RAC 5/8 does not work correctly, the [RAC] calibration function allows users to manually set the range of each level value on RAC 5/ RAC 8.

RAC

RAC-5

Name	Level1	Level2	Level3	Level4	Level5
Channel 0.	0 ~ 50	50 ~ 100	100 ~ 133	133 ~ 155	170 ~ 193
Channel 1.	0 ~ 50	50 ~ 100	100 ~ 133	133 ~ 155	170 ~ 193
Channel 2.	0 ~ 50	50 ~ 100	100 ~ 133	133 ~ 155	170 ~ 193

RAC-8

Name	Level1	Level2	Level3	Level4	Level5	Level6	Level7	Level8
Channel 0.	0 ~ 40	40 ~ 75	75 ~ 102	102 ~ 122	122 ~ 136	136 ~ 148	148 ~ 157	170 ~ 193
Channel 1.	0 ~ 40	40 ~ 75	75 ~ 102	102 ~ 122	122 ~ 136	136 ~ 148	148 ~ 157	170 ~ 193
Channel 2.	0 ~ 40	40 ~ 75	75 ~ 102	102 ~ 122	122 ~ 136	136 ~ 148	148 ~ 157	170 ~ 193

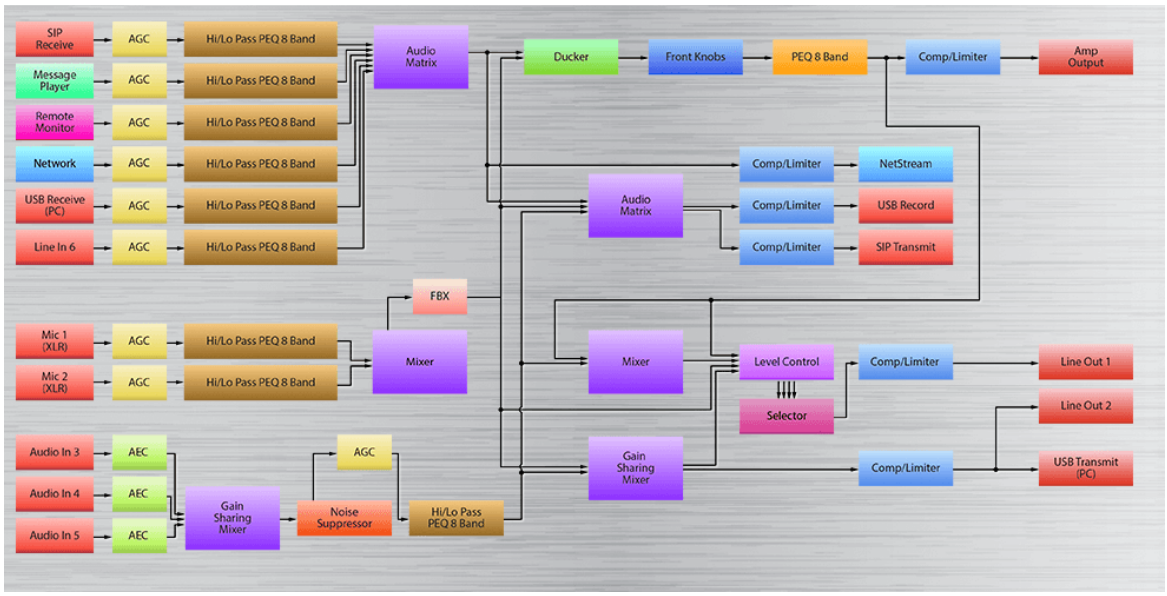
If the level value are too close or overlap with other level value, please set the value manually. To set the correct values, please see the example picture as below.

- Channel 1: The Level1 (17~22) on Channel 1 does not overlap the Level2 (51~59), and so does other values on Channel 1.
- Channel 2: The Level1 (16~20) on Channel 2 is overlapped the Level2 (20~39), and so does other values on Channel 2, therefore, please adjust the level values again.

RAC-5

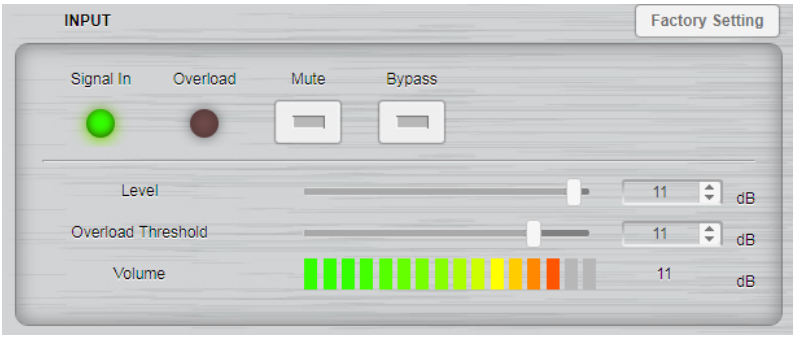
Name	Level1	Level2	Level3	Level4	Level5	
Channel 1	17 ~ 22	51 ~ 59	60 ~ 87	99 ~ 107	118 ~ 122	✓
Channel 2	16 ~ 20	20 ~ 39	38 ~ 69	69 ~ 109	108 ~ 129	X

4.9 DSP function



4.9.1 Input

The DSP settings of input sources including SIP Receive, Message Player, Remote Audio (Monitor), Network, USB Receive (PC) and Line In. The control window of the source settings are identical, see as below.



- Signal in LED: Light up when the level of mic input is above -30 dB.
- Overload LED: Light up when the level of input source is above the Overload Threshold (dB).
- Mute: Mute/unmute the source input, the LED will light in red while the input channel is muted.
- Bypass: Bypass the input signal to the output of Input component, the [Level] setting will be disabled.
- Level (dB): The input level of this source channel/mic channel.
- Overload threshold (dB): This threshold value is to determine the input signal is overloaded or not.
- Volume (dB): Display the real-time volume of input by meter.
- Factory setting: Click to restore all settings to factory default value.

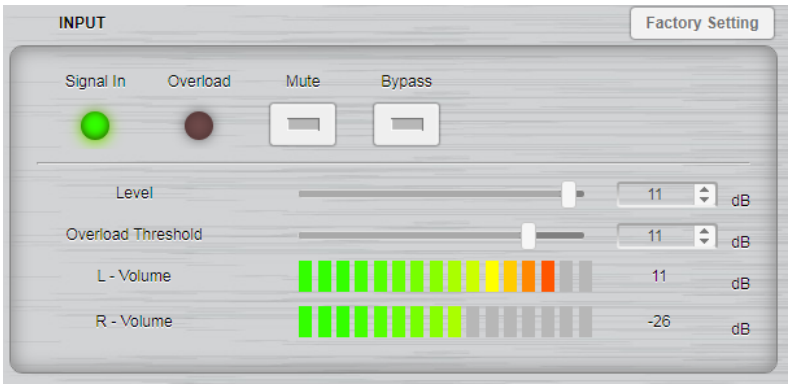
4.9.1.1 SIP Receive

The input of SIP intercom call.

The setting window of SIP Receive is identical to Input component.

4.9.1.2 Message Player

The message input source which users have added from Media Setting > Setting.



- L-Volume (dB): Display the real-time volume of left input channel by meter.
- R-Volume (dB): Display the real-time volume of right input channel by meter.

The setting window of Message Player is identical to Input component.

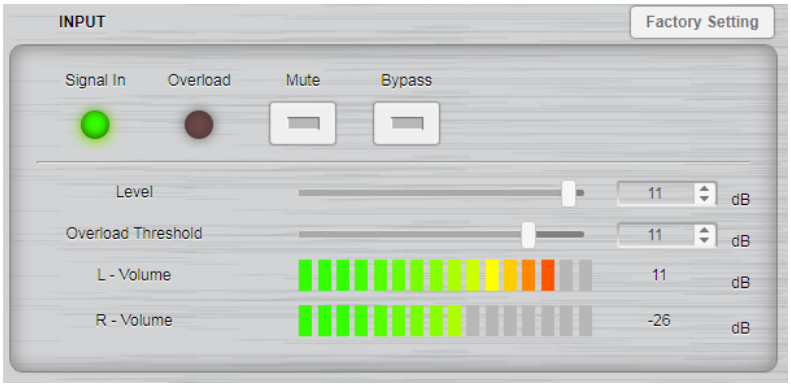
4.9.1.3 Remote Monitor

The monitoring audio input from other TERRACOM devices.

The setting window of Remote Monitor is identical to Input component.

4.9.1.4 Network

The audio input from network streaming.

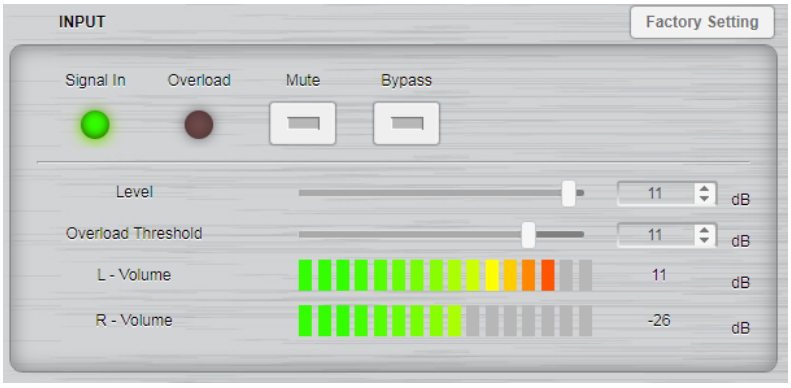


- L-Volume (dB): Display the real-time volume of left input channel by meter.
- R-Volume (dB): Display the real-time volume of right input channel by meter.

The setting window of Network is identical to Input component.

4.9.1.5 USB Receive (PC)

The input of the audio from PC/laptop such as the music player, skype call etc..



- L-Volume (dB): Display the real-time volume of left input channel by meter.
- R-Volume (dB): Display the real-time volume of right input channel by meter.

The setting window of USB Receive (PC) is identical to Input component.

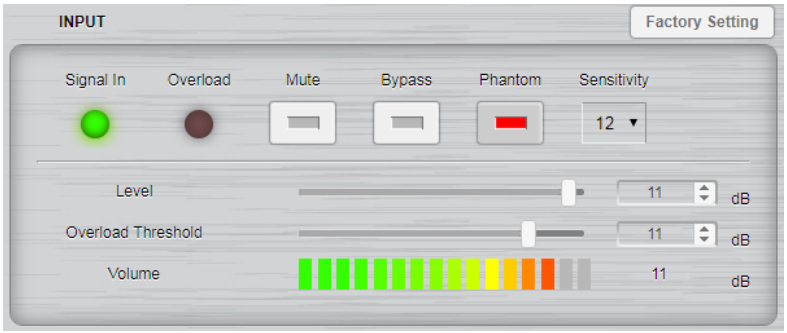
4.9.1.6 Line In 6

The LINE IN-PC audio input of TERRA-SAP device.

The setting window of Line In 6 is identical to Input component.

4.9.1.7 Mic 1/Mic 2 (XLR)

The Mic 1/Mic 2 audio input of TERRA-SAP device.



- Signal in LED: Light up when the level of mic input is above -30 dB.
- Overload LED: Light up when the level of input source is above the Overload Threshold (dB).
- Mute: Mute/unmute the source input, the LED will light in red while the input channel is muted.
- Bypass: Bypass the input signal to the output of Input component, the [Level] setting will be disabled.
- Phantom: Enable the [Phantom] button if the mic input requires 48VDC phantom power supply.

If the microphone does not applicable for phantom power supply, please disable this button, otherwise, the mic might burn potentially.

- Sensitivity: The preamplifier gain of input to pick up the level.
- Level (dB): The input level of this source channel/mic channel.
- Overload threshold (dB): This threshold value is to determine the input signal is overloaded or not.
- Volume (dB): Display the real-time volume of input by meter.
- Factory setting: Click to restore all settings to factory default value.

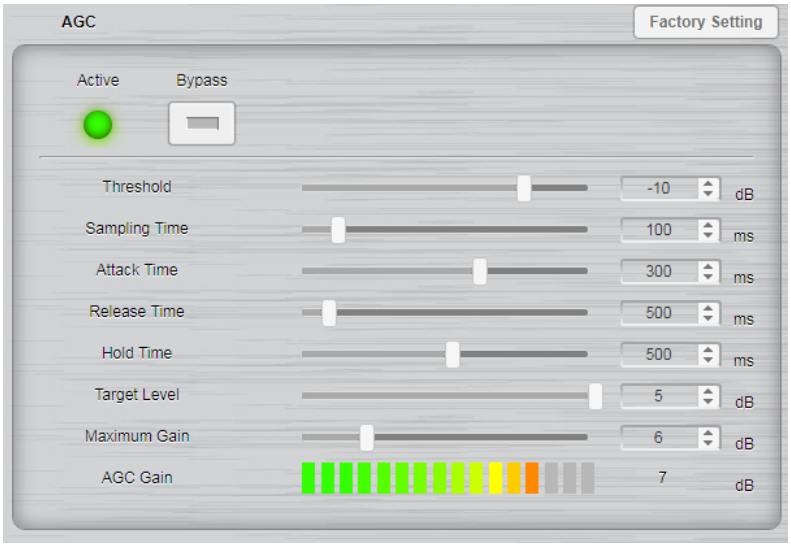
4.9.1.8 Audio In 3/4/5 (Phoenix)

The Audio In 3/Audio 4/Audio 4 (Phoenix) of TERRA-SAP device.

The setting window of Audio In 3/4/5 (Phoenix) is identical to Mic 1/Mic 2 (XLR) component.

4.9.2 AGC

With Automatic Gain Control (AGC), the input signal can be increased or decreased to a target level automatically. The AGC will effectively reduce the volume if the signal is too strong or raises the volume when the signal is weak. You can adjust the gain automatically by setting a target level.



- Active LED: Light up when the AGC is activated.
- Bypass: Bypass the input signal to the output of AGC component.
- Threshold (dB): When the audio input level is above this Threshold value, the AGC function will be activated.

Don't set the threshold too low, otherwise it will hear unexpected sounds such as ambient noise.

- Sampling time (ms): The time interval which measures the input level.

If the sampling time is too long, it will make the AGC too insensitive on the short peaks.

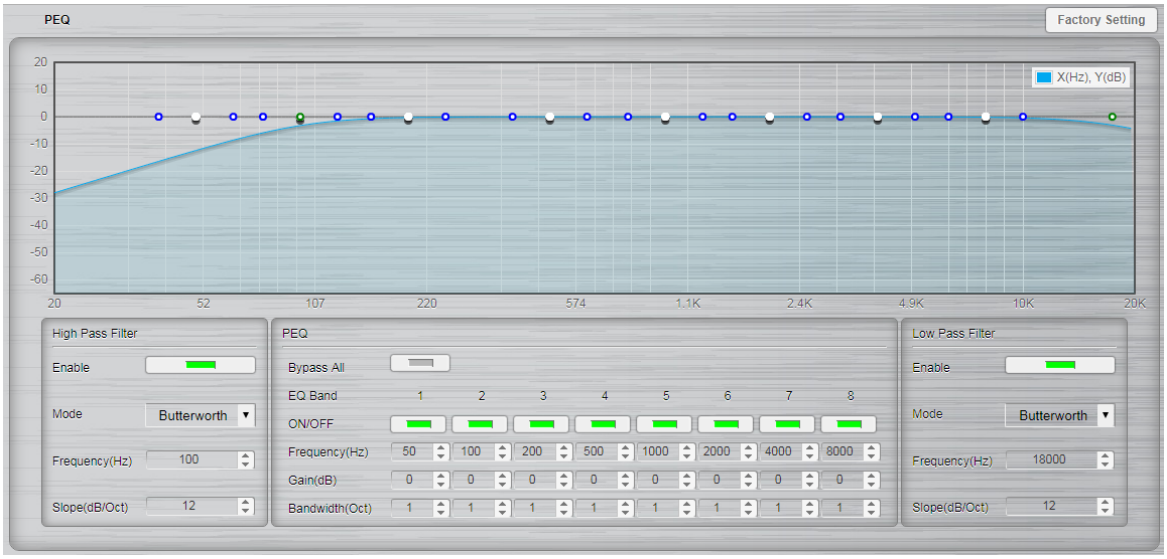
- Attack time (ms): The attack time is the fade-in time when the AGC starts to reach the target level.
- Release time (dB): The release time is the fade-out time it takes to release the gain (dB) when AGC is no longer working.
- Hold time: As opposed to the release time. When the mic channel signal continues below the [Threshold] after this Hold time, it will start to fade-out the gain. A correct setting of hold time can avoid inopportune deactivation such as the pause in speech.
- Target level (dB): The target level that the AGC attends to reach.
- Maximum gain (dB): The maximum gain for AGC to increase.

In order to keep natural audio sound, please avoid setting the max. gain too high.

- AGC gain (dB): Display the gain that the AGC increases/decreases the signal of input.
- Factory setting: Click to restore all settings to factory setting.

4.9.3 Hi/Lo Pass PEQ 8 Band

This components combines Hi/Low pass filter and PEQ together. It offers a dynamical graphical control window to easily know the overall results.



❖ High/low pass filter

This DSP component passes the high/low frequency and attenuate the frequency lower/higher than its cutoff frequency.

- Enable: Enable the filtering.
- Mode: The type of filtering (Linkwitz-Rilet, Butterworth, Bessel).
- Frequency (Hz): The frequency of cut.
- Stope (dB/Oct): The slope of attenuation.

❖ 6 band PEQ

PEQ (Parametric Equalizer) is a multi-band variable equalizers which controls the three primary parameters: gain, center frequency and bandwidth, making more precise adjustments to sound than other equalizers. The gain of each band can be controlled, the center frequency can be shifted, and bandwidth ("Q") can be widened or narrowed.

- Bypass all: Disable the PEQ function.
- ON/OFF: Activate/disable the selected EQ band.
- Frequency (Hz): Set the central frequency of a band.
- Gain (dB): Set the PEQ gain (attenuate or increase the selected frequency band).
- Bandwidth (Oct): Set the width around the frequency (Q factor) of selected frequency band.

❖ Graphical control window

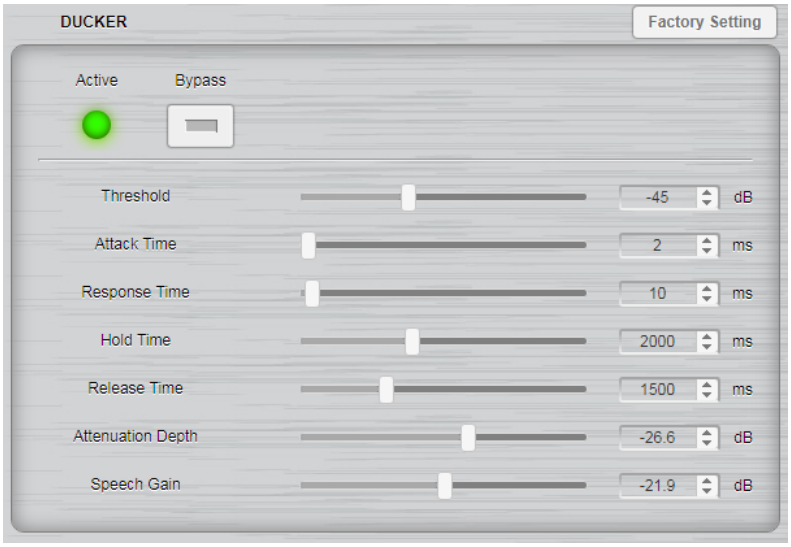
The parameters which are mentioned above can also be adjusted by a graphical control window. Once the parameters change, the graph will move together, and vice versa. It will show the result for the parameters.

- Axis-X: Frequency of output signal (Hz).
- Axis-Y: Level of EQ gain (dB).
- Blue control point: Adjust bandwidth.
- White control point: Adjust EQ gain (using vertical direction) and frequency (using horizontal direction).
- Green control point: Adjust the frequency of High/Low Pass filter.

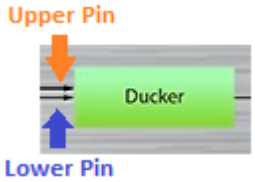
❖ Factory setting: Click to restore all settings to factory setting.

4.9.4 Ducker

The Ducker lowers the level of one audio signal (SIP/Message Player/Remote Audio/Network/USB Receive/Line In) based upon the level of a second audio signal (MIC1/MIC). A typical application is paging over background music: A ducker senses the presence of audio from a XLR microphone and triggers a reduction in the output level of the music signal for the duration of the paging signal. It restores the original level once the paging is over.



- Active: Light up when the Ducker is activated while the signal has been detected on MIC1/MIC2 channel (lower pin).



- Bypass: Disable the Ducker function.
- Threshold (dB): The threshold of detection on MIC1/MIC2 channel (lower pin). The SIP/Message Player/Remote Audio/Network/USB Receive/Line In channel (upper pin) is attenuated when the MIC1/MIC2 channel (lower pin) goes above this threshold.

To avoid the unexpected attenuation, don't set a threshold level too low.

- Attack Time (ms): The fade-in time of MIC1/MIC2 channel (lower pin) when the Ducker is activated.
- Response Time (ms): The time between the level detection of MIC1/MIC2 channel (lower pin) and the beginning of the Ducker's activation on SIP/Message Player/Remote Audio/Network/USB Receive/Line In channel (upper pin).

Don't set the "response time" too long, otherwise you won't hear the beginning of MIC1/MIC2 channel (lower pin).

- Hold Time (ms): The time interval during the signal of MIC1/MIC2 channel is below the Threshold.

Set enough "Hold time" to avoid the unexpected background level during the speeches breaks.

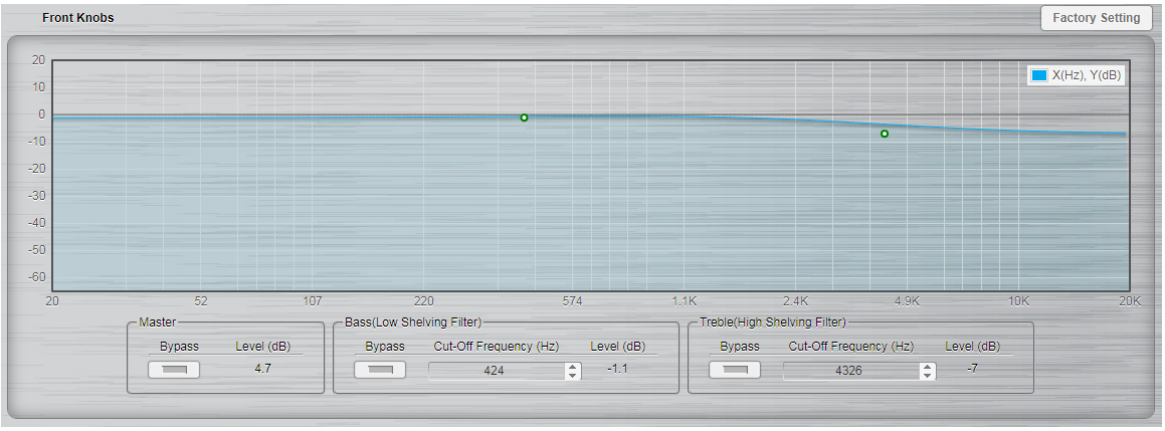
- Release Time (ms): The fade-out time of MIC1/MIC2 channel (lower pin) when the Ducker is not

activated.

- Attenuation Depth (dB): The level of SIP/Message Player/Remote Audio/Network/USB Receive/ Line In channel (upper pin) when the Ducker is activated.
- Speech Gain (dB): The level of MIC1/MIC2 channel (lower pin) when the Ducker is activated.
- Factory setting: Click to restore all settings to factory setting.

4.9.5 Front Knobs

Display the current master level/bass sound level/treble sound level of mic 1/mic 2 (XLR), and provide the low/high shelving filter which implements a first order response and cut to the frequency above/ lower than a certain point.



- Master
  - Bypass: Disable the master level setting function of mic 1/mic 2 (XLR) on TERRA-SAP.
  - Level (dB): Display the current master level of mic 1/mic 2 (XLR) on TERRA-SAP, if the master volume knob has been adjusted, this level value will be changed dynamically.
- Bass (Low Shelving Filter)
  - Bypass: Disable the bass sound setting function of mic 1/mic 2 (XLR) on TERRA-SAP.
  - Cut-Off Frequency (Hz): The frequency of cut.
  - Level (dB): Display the current bass sound level of mic 1/mic 2 (XLR) on TERRA-SAP, if the bass sound knob has been adjusted, this level value will be changed dynamically.
- Treble (High Shelving Filter)
  - Bypass: Disable the treble sound setting function of mic 1/mic 2 (XLR) on TERRA-SAP.
  - Cut-Off Frequency (Hz): The frequency of cut.
  - Level (dB): Display the current treble sound level of mic 1/mic 2 (XLR) on TERRA-SAP, if the treble sound knob has been adjusted, this level value will be changed dynamically.

❖ Graphical control window

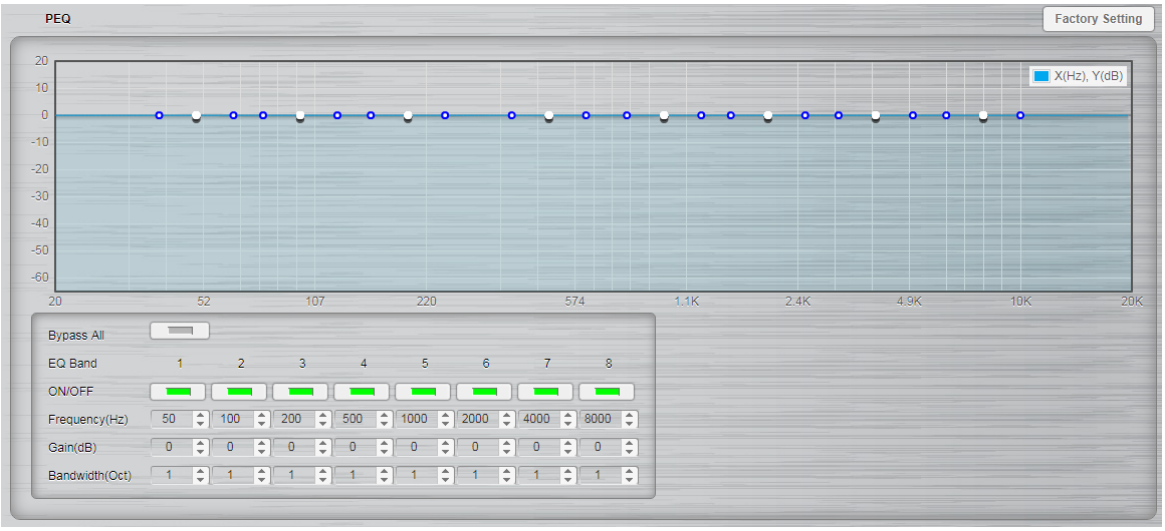
The parameters which are mentioned above can also be adjusted by a graphical control window. Once the parameters change, the graph will move together, and vice versa. It will show the result for the parameters.

- Axis-X: Frequency of output signal (Hz).
- Axis-Y: Level of response gain (dB).
- Green control point (Bass/Treble): Adjust the cut-off frequency of Bass Low Shelving Filter/ Treble High Shelving Filter.

❖Factory setting: Click to restore all settings to factory setting.

4.9.6 PEQ 8 Band

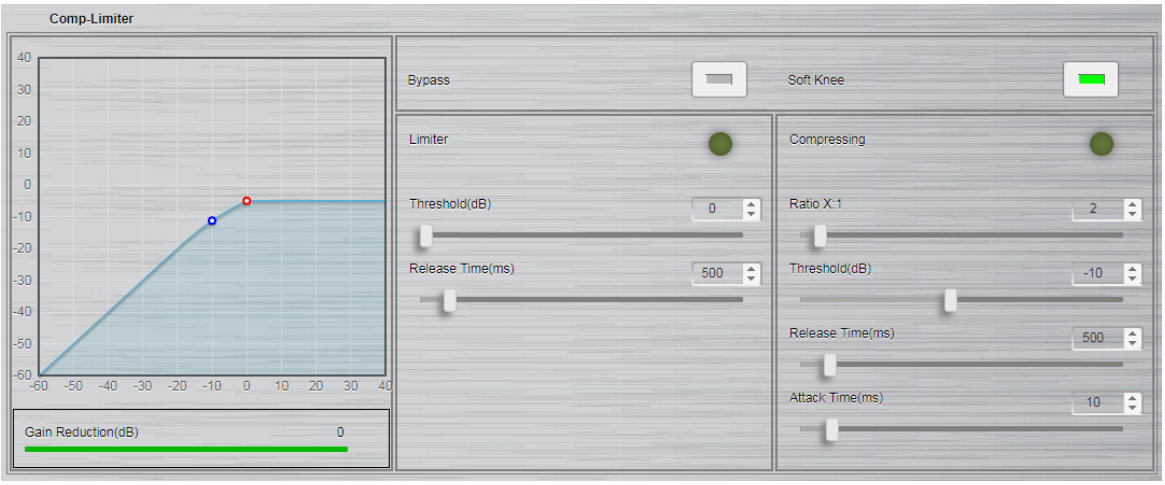
PEQ (Parametric Equalizer) is a multi-band variable equalizers which controls the three primary parameters: gain, center frequency and bandwidth, making more precise adjustments to sound than other equalizers. It is commonly used in audio recording and live sound reinforcement. The gain of each band can be controlled, the center frequency can be shifted, and bandwidth ("Q") can be widened or narrowed.



The setting window of Mic In 1/2/3 (Phoenix) is identical to Hi/Lo Pass PEQ 8 Band component.

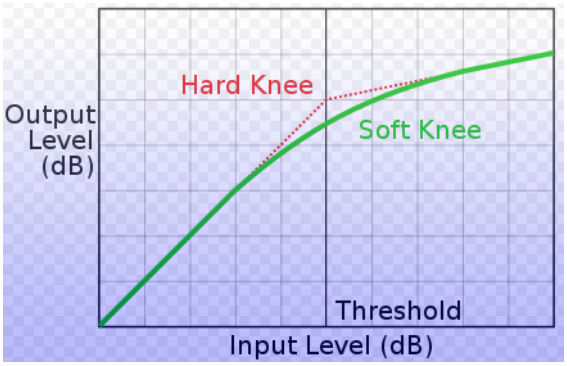
4.9.7 Comp/Limiter

Comp-limiter is a combination of the Compressor and the Limiter Component.



- Bypass: Disable the Comp-limiter function.
- Soft Knee: Enable/disable the “Soft Knee” mode. This element controls whether the bend in the response curve is a sharp angle or has a rounded edge. A soft knee slowly increases the compression ratio as the level increases and eventually reaches the compression ratio set by user. A soft knee reduces the audible change from uncompressed to compressed, especially for

higher ratios where the changeover is more noticeable.



Enable to smoothly increase the audio level to reduce distortion.

- Limiter:
  - Limiter LED: Light up when the limiting is activated.
  - Threshold (dB): Activate the Limiter function when input level above this value.
  - Release time (ms): The time it takes to release gain reduction.
- Compressing:
  - Compressing LED: Light up when the compression is activated.
  - Ratio X:1: Set the compression ratio, which the compressor will compress the input level by this compression ratio setting to be the output level.
  - Threshold (dB): Activate the Compression function when input level above this value.
  - Release time (ms): Set the time it takes to release the compressor gain. The Release Time is the period when the compressor is increasing gain to the level determined by the ratio or to 0 dB, once the level has fallen below the threshold.
  - Attack time (ms): Set the time it takes to respond to the input signal. The Attack Time is the period when the compressor is decreasing gain to reach the level that is determined by the ratio.

The attack time can decide the sensitivity of compressor. The longer of Attack Time is, the slower of the compression it will take, and vice versa.

- Gain reduction (dB): Indicate the current amount of gain reduction.
- Graphical Window
  - Axis-X/Y: Input/output signal level (dB).
  - Blue control point: Threshold (Compressor).
  - Red control point: Threshold (Limiter).
- Factory setting: Click to restore all settings to factory setting.

4.9.8 FBX (Feedback)

The Feedback component will evaluate the feedback characteristics of the audio system and adjust the necessary filters to suppress the feedback.

- Bypass all: Disable all filters.
- Hold all: Reserve the value of all filters. Enable this button if you don't want to release all the detected frequency after the [Lock Time].
- Manual all: Enable all the parameters of filters such as "Frequency", "Bandwidth" and "Gain" to be adjusted manually. This will disable the automatic detection.
- Reset all: Release all the detected frequency.
- Stop detect: Stop the process of feedback detection.
- Lock time (sec.): Set the time to keep the value of filter active when feedback is detected.

If the feedback phenomenon appears randomly for a short time, it's better to set appropriate [Lock Time] and not to use [Hold] function.

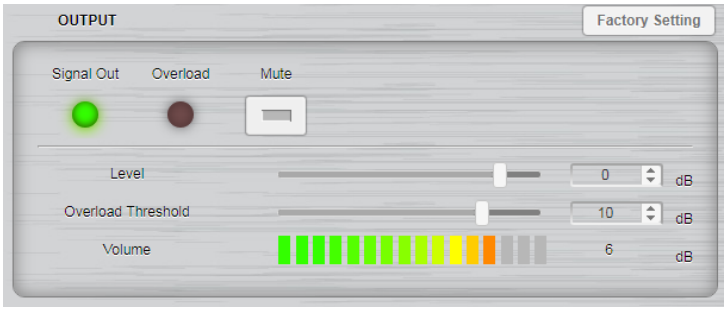
- Detect level (dB): Set the level to begin detecting the feedback.
- Depth (dB): Set the maximum level to suppress the frequency.
- Lock LED: Light up when a detected feedback frequency is being erased and locked it down for a notch filter.
- Bypass: Disable the selected filter.
- Hold: Reserve the value of selected filter. Enable this button if you don't want to release the detected frequency after the [Lock Time].

The default setting will keep the [Hold] option enabled, but if a portable/wireless microphones are in use, it is recommended to disable the [Hold] option in order to catch the filters dynamically.

- Manual: Enable the "Frequency", "Bandwidth" and "Gain" to be adjusted manually. This will disable the automatic detection at the selected band.
- Frequency (Hz)/Bandwidth (Oct)/Gain (dB): Manually set the Frequency/Bandwidth/attenuation of notch filter for attenuating the feedback.
- Frequency level (Hz): Display the the locked frequency.
- Bandwidth level (Oct.): Display the bandwidth of the locked notch filter.
- Gain level (dB): Display the attenuation of the locked frequency.
- Factory setting: Click to restore all settings to factory default value.

4.9.9 Output

The channel of audio output.



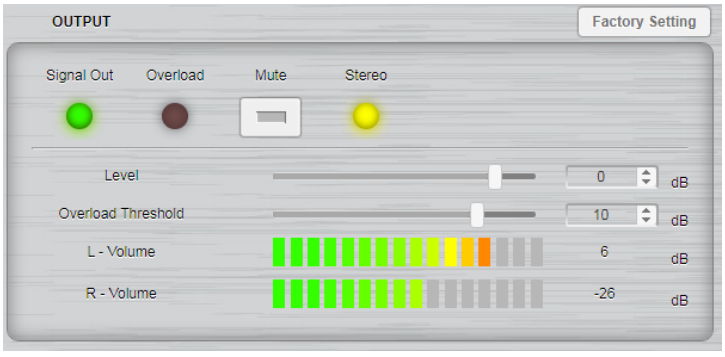
- Signal out LED: Light up when the signal level of output > -30 dB.
- Overload LED: Light up when the channel level is above the Overload Threshold (dB).
- Mute: Mute/unmute the output signal, the LED will light in red while the output channel is muted.
- Level (dB): The level of output channel.

The 20W x 2CH amp output of TERRA-SAP is fed by 8 ohm load loudspeaker. However, if users enable the [4 ohm speaker] setting on Setup1 > Basic Setting > Amp, the [Level] setting on DSP > Amp Output window page will be mandatory to set from -90dB ~ -6dB. If the TERRA-SAP is fed by 8 ohm load speaker, the original parameter of [Level] setting on DSP > Amp Output window page is -90dB ~ 20dB.

- Overload threshold (dB): This threshold value is to determine the output signal is overloaded or not.
- Volume (dB): Display the real-time volume of output by meter.
- Factory setting: Click to restore all settings to factory default value.

4.9.9.1 Amp Out

The internal amplifier output of TERRA-SAP device.



- L-Volume (dB): Display the real-time volume of left input channel by meter.
- R-Volume (dB): Display the real-time volume of right input channel by meter.

The setting window of Amp Out is identical to Output component.

4.9.9.2 Net Stream

The audio output from network streaming.

The setting window of Net Stream is identical to Output component.

4.9.9.3 USB Record

The audio output of USB recording on TERRA-SAP device.

The setting window of USB Record is identical to Output component.

4.9.9.4 SIP Transmit

The output of SIP intercom call.

The setting window of SIP Transmit is identical to Output component.

4.9.9.5 Line Out 1/2

The LINE Out 1 (PC)/Line Out 2 (Phoenix) audio output of TERRA-SAP device.

The setting window of Line Out 1/2 is identical to Output component.

4.9.9.6 USB Transmit (PC)

The audio output from PC/laptop such as the music player, skype call etc..

The setting window of USB Transmit (PC) is identical to Output component.

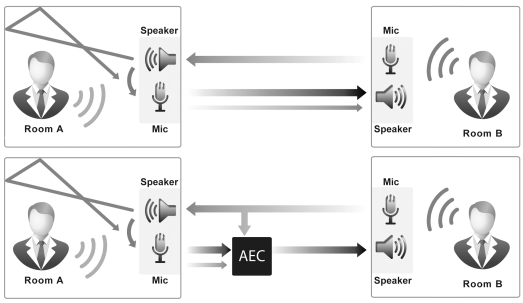
4.9.10 AEC

AEC (Acoustic Echo Cancellation) is to eliminate the echoes when under a full-duplex teleconferencing. When the near-end microphone picks up the audio from the far-end via the near-end loudspeaker, it will remove the echoes.

For example, see the figure on the right.

If Room A and Room B are under teleconferencing, speech from Room B transmits via Room A's open microphone with reverberation, and is sent right back to Room B. This process will continue again and again.

With the patented RAPIDO™ AEC algorithm, this will filter out all the echo from Room A, preventing Room B's microphone from transmitting it back to Room B.



- Talk LED: This LED lights up when the signal is detected.
- Echo LED: This LED lights up when the echo is detected.
- Reset: When the echo cancellation does not function well as intended, click this button to reset.
- ERLE (dB): ERLE (Echo Return Loss Enhancement) is the attenuation value (dB) of acoustical echo achieved by AEC.

The bigger ERLE value indicates more echo is being removed, which means the AEC function is working harder. For example, an ERLE "30.0 dB" is better than ERLE "20 dB".

- Near-end volume (dB): The audio level of the near-end audio signal.
- Far-end volume (dB): The audio level of the far-end audio signal.
- AEC coefficient: Choose [Perform], [Bypass] or [Hold].
  - Perform: Enable the AEC function.
  - Bypass: Disable the AEC function.
  - Hold: Hold the AEC coefficient which stops at the end.
- Non-linear processing (NLP)
  - Off: Disable the non-linear processing function. Please note that some echo may occur.
  - Soft: For minor acoustical echo environments.
  - Medium: For most applications (recommended).
  - Aggressive: For very difficult acoustical echo environments.

If the Aggressive option is enabled, the NLP will remove the far-side echo powerfully, but it may attenuate some of the near-end signal as well.

- Microphone threshold (dB): The threshold value of microphone.

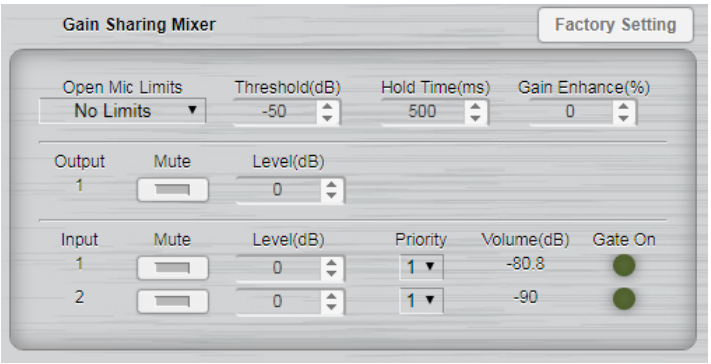
If the value is too high, it will render the echo cancellation nonfunctional. In contrast, if the value is too low, it may not be good to keep the AEC coefficients at speaking volume.

- Factory setting: Click to restore all settings to factory setting.

4.9.11 Gain Sharing Mixer

The Gain Sharing Mixer is able to mix multiple input signals into one signal output automatically. This component attenuates all inputs by dividing the sum of all volume level to the volume level of each input.

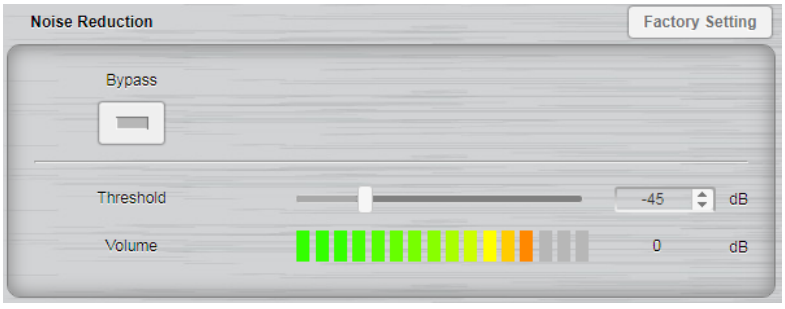
The activation of the channel(s) is depended on threshold value and the priority setting. It adjusts the signal output level on depending on the numbers of activated input channels. This function can be worked in conference applications or houses of workshop where the mixing has to be executed automatically.



- Open mic. limits: Set the number of the open (activated) microphone for this component.
- Threshold (dB): Set the threshold level to activate the channel when the level of mic input is above this value (default -70dB).
- Hold time (ms): The time to keep the gate open after no audio input is continually detected.
- Gain enhance %: Set the gain sharing percentage of the mixed output. If set a higher gain sharing percentage, the mic in bigger volume will become much bigger, and the mic in small volume will become much smaller.
- Output mute: Mute or umute the mixed output signal.
- Output level (dB): The volume level of the channel's output signal.
- Input mute: Mute or unmute the selected input channel.
- Input level (dB): Increase or decrease the selected input level of channel.
- Priority: Set the priority of mic input if there's too many inputs are activated, then the lower priority of mic will not be mixed if the number of total mic is more than the number you set on [Open Mic. Limits]. 1 is the highest.
- Volume (dB): Display the current volume of mic input.
- Gate on: Light on when the mic is activated.
- Factory setting: Click to restore all settings to factory setting.

4.9.12 Noise Suppressor

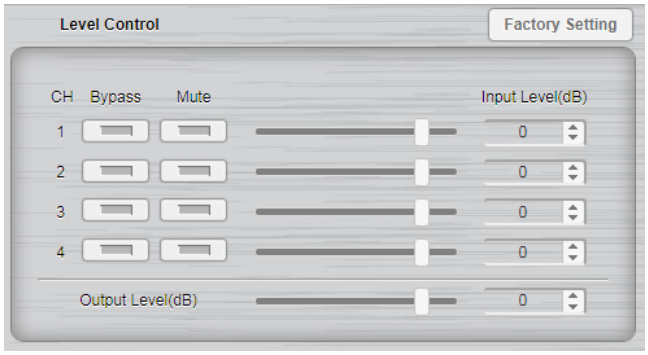
Allow to reduce the background noise, and improve the audio input quality of Mic 1/Mic 2/Mic 3.



- Bypass: Bypass the input signal to the output of Noise Suppressor component.
- Threshold (dB): The background noise is analysed and calculated for reduction data based on this threshold setting.
- Volume (dB): Display the volume of microphone input.
- Factory setting: Click to restore all settings to factory setting.

4.9.13 Level Control

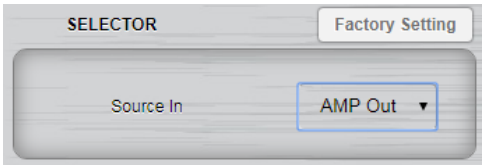
Adjust the volume level of the input signal.



- CH1: SIP input + Message input + Remote Audio input + Network input + USB Receive input + Line In input + Mic1/2 (XLR)
- CH2: SIP input + Message input + Remote Audio input + Network input + USB Receive input + Line In input + Mic1/2 (XLR) + Mic 1/2/3 (Phoenix)
- CH3: Mic1/2 (XLR)
- CH4: Mic1/2 (XLR) + Mic 1/2/3 (Phoenix)
- Bypass: Bypass the input signal to the output of Level Control component.
- Mute: Mute the input of Level Controller component.
- Input level: Adjust the level of an input channel.
- Output level: Adjust the output level of CH1~CH8.
- Factory setting: Click to restore all settings to factory setting.

4.9.14 Selector

Select which input channel is routed to the signal output.



- Source in
  - AMP Out: SIP input + Message input + Remote Audio input + Network input + USB Receive input + Line In input
  - All Inputs: SIP input + Message input + Remote Audio input + Network input + USB Receive input + Line In input + Mic1/2 (XLR) + Mic 1/2/3 (Phoenix)
  - Teacher's Mics: Mic1/2 (XLR)
  - All Mics: Mic1/2 (XLR) + Mic 1/2/3 (Phoenix)
- Factory setting: Click to restore all settings to factory setting.

4.10 About

4.10.1 Copyright

The School Sound System - a full audio over IP-based classroom & courtroom solution including teaching, paging, messaging, class change & scheduling, hands-free intercom & emergency communication, providing a safe and secure environment for students, staff, judges, lawyers and visitors. The system incorporates Terra-SAP amp processor, a range of IP loudspeakers and BCM201W/BCM201B boundary microphone which can be used for both intercom and speech monitoring applications.

The Terra-SAP networkable processor is equipped with 20W x 2CH amplifer and also acts as an audio hub for local connected devices such as mic/line inputs, USB interface for message/music storage and playback, and the connection with audio-visual devices such a projectors as well as logic input/outputs. Local volume control and audio input selection can be managed using RAC5 or RAC8 source selector & volume control remote. In case of an emergency, press the supervised EVAC button on Terra-SAP in order to alert the central monitoring station to respond to an incident.

The TerraManager Graphical User Interface (GUI) software brings all together by facilitating full control, paging, intercom, messaging, recording, streaming, audio routing, device I/O monitoring, and bell scheduling with the greatest ease. Communication between administrative staff and classroom or judges can be quickly established whether it is a district wide school & court intercom, paging, messaging/BGM distribution on multiple stores, and so on.

5 Tools

5.1 Icecast

This chapter shows how to use Icecast server, Edcast and Winamp to stream audio to Terracom.

❖ Program Installation

- Icecast Server:

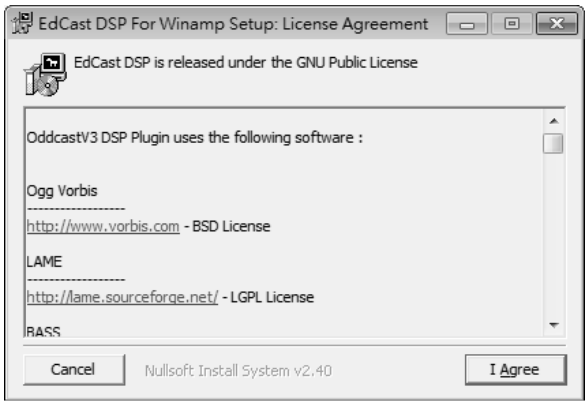
  You can find the newest version on Icecast website. Here we use Icecast 2 for Windows (32bit) and follow the steps of setup wizard to install.

- Winamp Media Player:

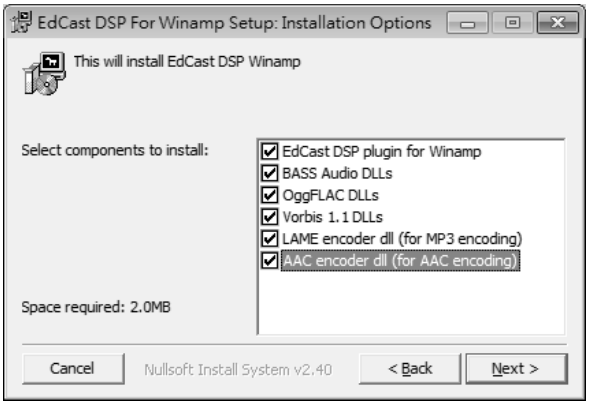
  You can find the newest version on Winamp website, follow the steps to install.

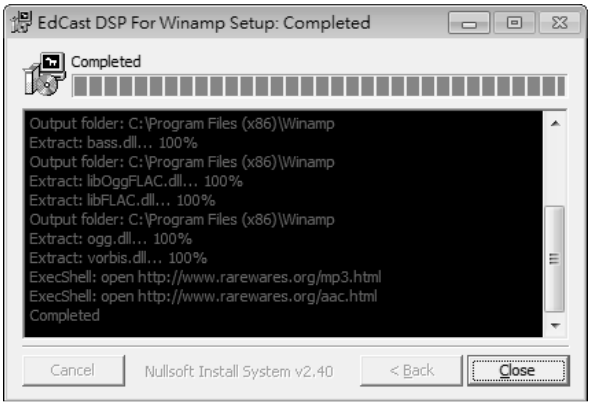
- EdCast:

  EdCast supports 48k sample rate and it's exactly what we need for Terracom. Here we use EdCast DSP for Winamp.



If you want to stream MP3, tick the checkbox of LAME encoder dll (for MP3 recording).





❖ Setting the Icecast Server:

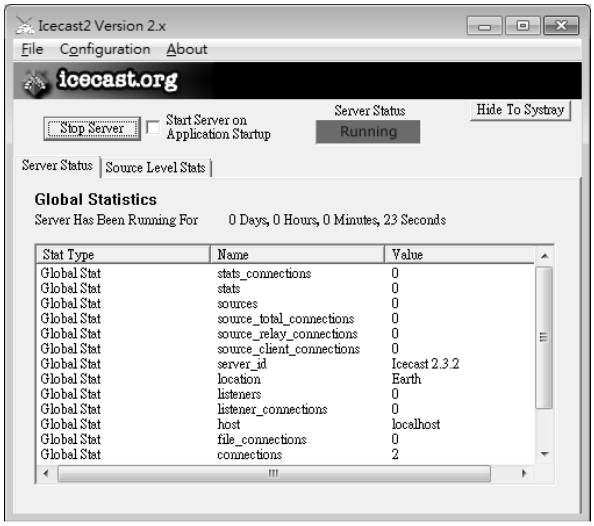
After installing the Icecast, double click its icon to open the server.

To set the port and password, click the "Configuration > Edit Configuration" to open a text file.

- Find the line <port>9866</port> and choose a port which should be an even number and NOT in the range 8000~9000.
- Find the text between the section <authentication>ID and password</authentication>, this will be required in EdCast's setting fields.

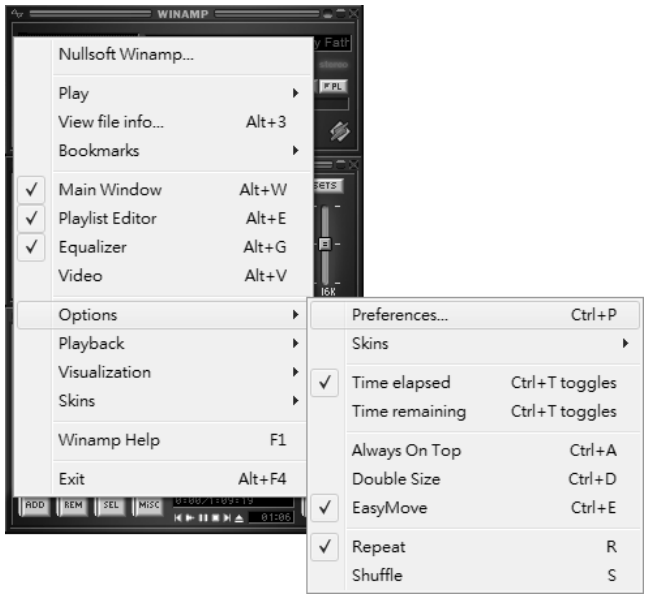
Once the setting is done, click the [Start Server] button, the server will start running as shown in the picture on the right.

- You can click the [Hide To Systray] button to hide the window.

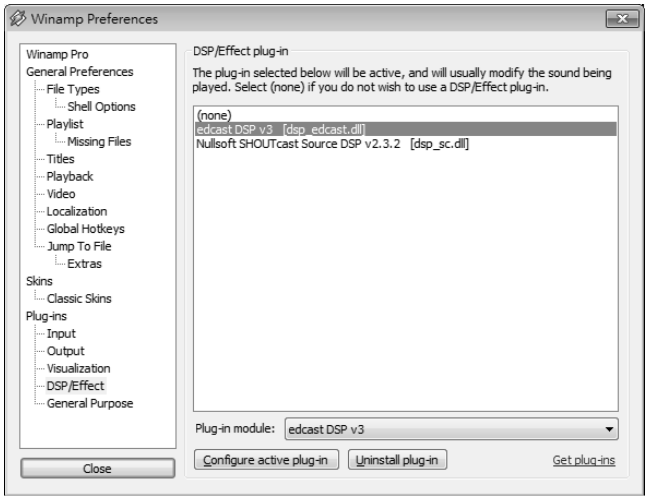


❖ Set Winamp Media Player and EdCast plug-in:

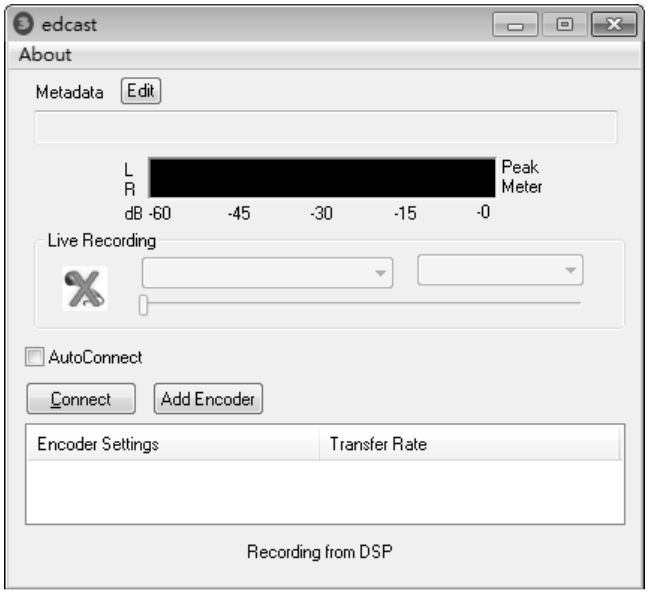
- Assign the DSP plug-in of Winamp media player and set the parameters of EdCast.
- Right click on the Winamp panel and choose "Options > Preferences"



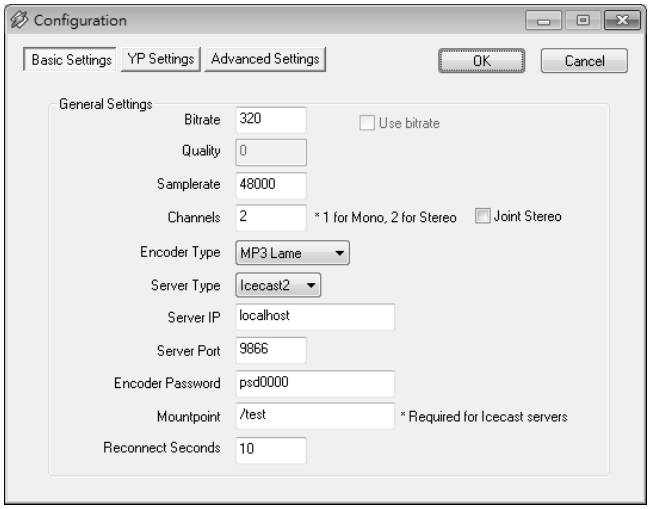
❖ Once the Winamp Preference window opens, choose the item "edcast DSP v3 [dsp_edcast.dll]" in the "DSP/Effect" under the "Plug-ins" section.



- Now double click the item to open the EdCast's setting window, it appears as shown in the picture on the right.



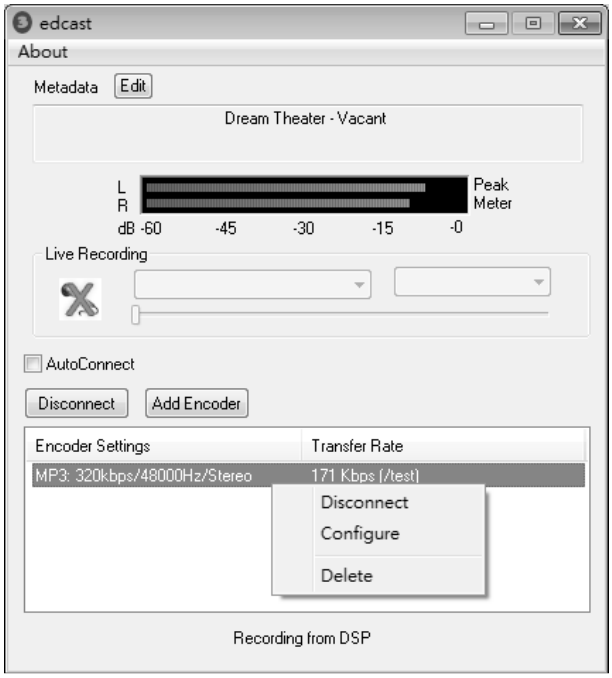
- Click [Add Encoder] button and set the encoder, only the Basic Setting matters the stream.
  - Sampling rate: The sample rate must be 48k or the Terracom would not play the files.
  - Encoder type: Choose MP3. Here we use the MP3 Lame encoder found on a website.



Copy the file into the Winamp program directory.

  - Server IP: Use the default value "localhost" if you're running the server on your PC.
  - Server Port: Set the port in the Icecast server's configuration window.
  - Encoder password: Set the password in the Icecast server's configuration window.
  - Mountpoint: This item is required for icecast, so we assign a "/test" for it.

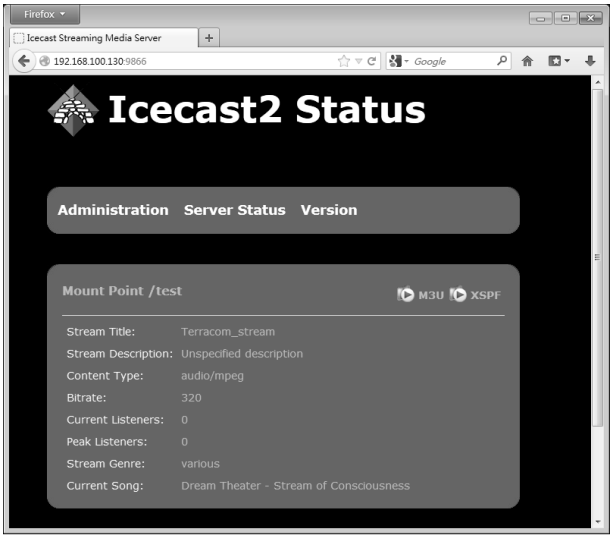
- Click [Connect] button to start the encoder, the stream will start after few seconds.
- You can right-click to disconnect, configure or delete the encoder as shown in the picture on the right.



❖ Icecast Web Interface:

You can direct your browser to http://192.168.xxx.xxx:9866/ (replace 192.168.xxx.xxx with your own IP address when it's localhost) and browse through the web interface.

The Current Song showing the dynamic changes with your Winamp player.



❖ Receiving stream from Icecast Server:

Go to Terracom's "Auido Matrix" webpage and set as shown in the picture below, remember to add the "Mountpoint" which is set in the EdCast plug-in setting window.

In the "Setup > Basic Setting" page as mentioned before, you can set the "Stream Buffer" time.

N/W IN	MODE	SHOUTCAST/ICECAST URL	STREAM MULTICAST IGMP IP	PORT		
SOURCE 1	SHOUTcast/icecast	http://192.168.100.130:9866/test			IN1	4
SOURCE 2	SHOUTcast/icecast	http://192.168.100.61:9878/jms			IN1	5
SOURCE 3	Stream Multicast		239.240.100.2	4444	IN1	6
SOURCE 4	Stream Multicast		239.240.100.3	4444	IN1	7

6 Maintenance

❖ Cleaning

⚠ Make sure to unplug the main power supply of TERRA-SAP device prior to cleaning.

The panels and chassis can be cleaned with a soft cloth and mild non-abrasive cleaning solution.

Avoid cleaning powders or scrubbing pads, as these will scratch and dull the paint. Do not apply liquid directly to the surface. Dampen the cloth with the cleaning solution and wipe gently.

❖ Dust removal

After used the unit for a long-time, especially in dusty environments, the heat sinks may become clogged with dust. This will interfere with cooling from the air inlets, and lead to higher temperature operation and reduced life.

Dust can be most easily removed by brushing or directing an air jet between the fins of the heat sinks.

❖ User maintenance

User maintenance should be done by qualified personnel only.

⚠ Dangerous mains voltages are present inside the units. Unplug the main power supply before you do any maintenance.

Users can inspect if any broken connectors, ground, cable connections, or loose screws on the outside of TERRA-SAP device.

If any loose parts rattle around on the inside when the TERRA-SAP device is turned over in all directions, please shut down the TERRA-SAP device immediately, as a loose part could lodge in a dangerous place and cause further damage or shock hazard.

❖ Require service

If the TERRA-SAP device isn't working properly or the proper operation cannot be restored, the TERRA-SAP device may require service from TERRACOM Technical Support. This must be examined by qualified technical personnel, to avoid shock hazard or improper repairs. Please contact your dealer or TERRACOM Feedback.

7 Troubleshooting

❖ Forget the IP address of your TERRA-SAP device and cannot connect to the web browser.

Short-circuit (close) the contact input 1-pin and G-pin, the IP address will be read out via the connected speakers.

❖ The TERRA-SAP device cannot connect to network.

1. Check if the Ethernet cable has loosen or not connected, the LED of Ethernet connector shall light up.
2. Check if the Status LED on the front panel has flashed four times.

❖ No sound or audio from speakers.

1. Check if the volume meter of Output component has changed in real-time. If yes, the audio setting might be wrong. If no, see Step 2.
2. Check if the wiring of speaker lines is connected correctly and tightly.

❖ Can't Access the USB

1. Make sure the file system on the USB is FAT32.
2. If the USB driver has not been safely removed, there might be a file with .db-journal extension created. Delete that file and insert the USB key to the TERRA-SAP device again.

❖ When the [AMP Over Current] status is detected on TERRA-SAP device, it will be recorded on TERRA-SAP web browser > Log List. See the following troubleshooting of [AMP Over Current]:

1. Firstly, the internal amp of TERRA-SAP will automatically reboot (max. 6 times).
2. If this [AMP Over Current] status is still present, the TERRA-SAP will shut down the internal AMP (internal prevention mode), and the [AMP Over Current] warning will be recorded on TERRA-SAP web browser > Log List. Then the internal AMP will be rebooted again after 1 minute.
3. If this [AMP Over Current] status is still present, the TERRA-SAP will continue the operation on Step 1~Step 2 until the [AMP Over Current] status has solved.
4. If the [AMP OK] log shall be recorded on Log List.

---

8 Technical data

8.1 TERRA-SAP

- Electrical

DC power input:	21VDC ~ 26VDC
Max. power consumption:	60W
Rated loaded capacitance:	680 nf

- Internal power amplifier

Rated output power:	20W x 2CH (8 ohm load)
Frequency response:	20Hz ~ 20kHz (±3 dB) @ 0 dBu
THD+N:	<0.5%@24dBu gain
SNR:	>94dB

- Audio characteristics (general)

A/D-D/A bit resolution:	24 bit
Sampling rate:	48 kHz
Frequency response:	20 Hz ~ 20 kHz (±1.5 dB) @ 0 dBu
SNR:	> 92 dB

- Audio characteristics (mic)

EIN:	< -110 dBrA @ 12 dB gain
Input impedance:	10k ohm
Input gain range (MIC-1&2):	6~18 dBu (adjustable)
Maximum input level (mic):	-3 dBu @ 6dB gain
CMRR:	> 66 dB @ 12dB gain, -12dBu (1 kHz) in
THD+N:	< 0.05 % @ 12dB gain, -12dBu (1 kHz) in
Crosstalk:	> 70 dB @ 6dB gain, -6dBu (10 kHz) in
Phantom power:	48 VDC, 7 mA

- Audio characteristics (euro-block line in & line out)

Input gain range:	12/24/36/48 step (fixed)
Input impedance:	10k ohm
Output impedance (balanced):	20 ohm
Maximum input level (line in):	-12dBu @ 12dB gain
Maximum output level (line out):	0dBu @ 0dB gain

- Audio characteristics (phone jack line in & line out)

Input impedance:	5k ohm
Output impedance (balanced):	6 ohm
Maximum input level (line in):	-3dBu @ 0dB gain
Maximum output level (line out):	0dBu @ 0dB gain

- Network

Maximum distance:	100m (RJ45 connector, STP CAT5/6)
Speed:	100Mbps

- Storage

Type:	NAND Flash
Size:	100MB

- Contact outputs

Maximum voltage:	100 VDC
Maximum current:	0.5A

- Contact inputs

Contact mode	Non-isolated analogue interfaces with internal pull-up to +3.3V by 6.2k ohm
	Monitored analogue contact thresholds ▪ Faulty-open circuit: > 2.2 VDC ▪ Inactive voltage: 1.5 ~ 2.2 VDC ▪ Active voltage: 1.5 ~ 0.8 VDC ▪ Faulty-short circuit: < 0.8 VDC

- Mechanical

Dimensions (W x H x D):	215 x 45 x 130 mm (9 x 2 x 5.1 inch)
Weight:	0.5 kg (1.1 lb)
Colour:	RAL 7016

- Environmental

Operating temperature:	-5 ºC ~ +55 ºC (+23 ºF ~ +131 ºF)
Storage temperature:	-40 ºC ~ +70 ºC (-40 ºF ~ +158 ºF)
Relative humidity:	20% to 95%
Air pressure:	600 to 1100 hPa
Heat dissipation:	68 BTU/hr

- Certification

• CE/EMI: EN 55013/CISPR13 (pending)
• CE/EMS: EN 61000-4-2(ESD) (pending)

8.2 EVC-SW01W/EVC-SW02W

- Controls and Indicators

Front panel:	Call button with illuminated LED
Rear panel:	4 euro-block connectors on EVC-SW01W to connect to the contact inputs of TERRA-SAP

- Electrical

Max. power consumption:	< 0.2W

- Relay outputs

Maximum voltage:	100 VDC
Maximum current:	0.5A

- Control inputs

Contact mode	Non-isolated analogue interfaces with internal pull-up to +3.3V by 6.2k ohm
	Monitored analogue contact thresholds ▪ Faulty-open circuit: > 2.2 VDC

	▪ Inactive voltage: 1.5 ~ 2.2 VDC ▪ Active voltage: 1.5 ~ 0.8 VDC ▪ Faulty-short circuit: < 0.8 VDC

- Mechanical

Dimensions (W x H x D):	EVC-SW01W: 70 x 114 x 30 mm (2.6 x 4.5 x 1.9 inch) EVC-SW02W: 72 x 119 x 40 mm (2.9 x 4.7 x 1.6 inch)
Cutout:	EVC-SW01W: 45 x 105 mm (W x H) EVC-SW02W: 25 mm (diameter)
Weight:	0.1 kg (0.2 lb)
Finish:	EVC-SW01W: plastic ABS panel EVC-SW02W: stainless steel panel with metal call button

- Environmental

Operating temperature:	-5 ºC ~ +55 ºC (+23 ºF ~ +131 ºF)
Storage temperature:	-40 ºC ~ +70 ºC (-40 ºF ~ +158 ºF)
Relative humidity:	20% to 95%
Air pressure:	600 to 1100 hPa
Heat dissipation:	68 BTU/hr

8.3 BCM201W/BCM201W

- Electrical

Phantom power requirement:	9 VDC ~ 48 VDC

- Audio characteristics (general)

Frequency response:	50 ~ 18 kHz
Capsule sensitivity:	-42 (±3) dBu @ 1 kHz (0 dBu=1VPa)
Dynamic range:	113 dB
Maximum SPL:	128 dBA @ 30 cm
SNR:	58 dB(A)
Output impedance:	130 ohm

- Microphone characteristics

Capsule type:	Electret condenser
Capsule directivity:	Omnidirectional

- Mechanical

Dimensions (W x H x D):	• Diameter: 20 mm (0.8 inch) • Length: 100 mm (3.9 inch) • Mic shield cover diameter: 75 mm (3 inch) • Mic cable length: 300 mm (11.8 inch)
Weight:	0.1 kg (0.2 lb)
Color:	White/Black
Finish:	ABS plastic
Installation:	Flush-mount or pendant

- Environmental

Operating temperature:	-5 ºC ~ +55 ºC (+23 ºF ~ +131 ºF)
Storage temperature:	-40 ºC ~ +70 ºC (-40 ºF ~ +158 ºF)
Relative humidity:	20% to 95%

9 Contact information

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