

AudioInRoom

**KNX controller for audio with Bluetooth
and auxiliary input – 4 outputs**

ZMU-AUIR

Application Program Version: 1.0
User manual edition: [1.0]_a

CONTENTS

Contents	2
1. Introduction	3
1.1 AudioInRoom	3
1.2 Audio Playback System	4
1.3 Instalation	6
1.4 Bluetooth Connection	8
1.4.1 Check-in / Check-out	8
1.4.2 Pairing	8
1.5 Inicialization and power tension	9
2. Configuration	10
2.1 General	10
2.2 BLUETOOTH AUDIO MODULE	11
ANNEX I. Communication Objects.....	18

1. INTRODUCTION

1.1 AUDIOINROOM

AudioInRoom from Zennio is KNX interface capable of playing audio from an external device, such as a smartphone, which is connected via Bluetooth or through an auxiliary input (for example, for televisions).

The most notable features of this device are:

- **Audio Playback** from an external user device.
- **Audio Available Controls:**
 - Play/Stop.
 - Next track/Previous track.
 - Volume.
- **Bluetooth/Auxiliary Input** audio source selector.
- Bluetooth pairing with configurable **password**.
- **Ring tone**.
- **2 independent stereo channels of audio output**.
- **Heartbeat** or periodic “still-alive” notification.

1.2 AUDIO PLAYBACK SYSTEM

The following figure shows the main elements involved in the audio playback system through AudioInRoom, either from an external Bluetooth source or from the Auxiliary Input:

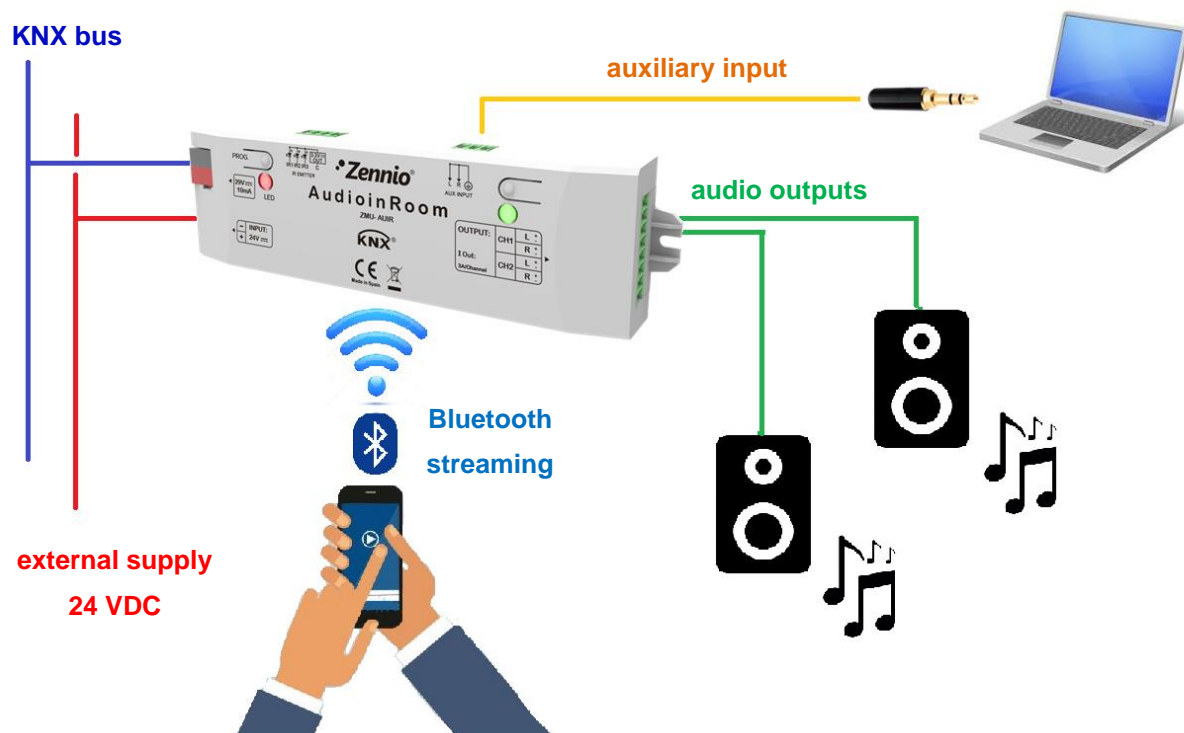


Figure 1. AudioInRoom playback system elements.

- **AudioInRoom:** KNX system for audio playback from a device connected via Bluetooth or through the auxiliary input. Allows Play/Stop, Next track/Previous track and volume control through KNX bus.
- **Bluetooth Streaming:** Bluetooth audio source linked to the KNX device by means of a pairing with configurable password.
- **Auxiliary Input:** AudioInRoom can also be connected to systems without Bluetooth. This is possible thanks to the Auxiliary Input, using an analogue audio connector (mini Jack) or a RCA connector. In these cases, the playback control can only be carried out from the own user device audio player.

- **Audio Outputs:** two independent channels with two connectors each for speakers, which can be enabled or disabled individually. The audio output signal from each channel can be configured to be played in stereo or mono mode.

1.3 INSTALATION

AudioInRoom is connected to the KNX bus through the built-in terminal (2). This device requires an **external 24V DC power supply** (1).

1. 24VDC Power Supply.
2. KNX Connector.
3. Programming LED.
4. Programming Button.
5. Not used.
6. Audio Auxiliary Input.
7. Ventilation Grill.
8. Testing Button.
9. Testing LED.
10. Audio Output Channels.

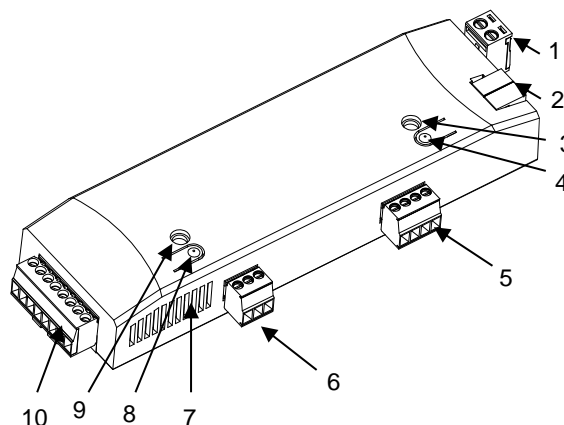


Figure 2. AudioInRoom.

A short press in **Programming Button** (4) will make the device enter the programming mode. The **Programming LED** (3) will then light in red. On the contrary, if this button is held while the device gets connected to the bus, AudioInRoom will enter the **safe mode**. In such case, the programming LED will blink in red colour.

Moreover, a 3 seconds press in **Testing Button** (8) turns the Bluetooth module on and sets the device into **pairing mode**. The **Testing LED** (9) will light:

- In blue when the Bluetooth module is on.
- In green when pairing is active.
- Flashes red in the absence of KNX bus voltage, blending with the other colours if several notifications are made at the same time.

If a device without a Bluetooth module is to be connected, it must be connected via the **audio auxiliary input** (6). Figure 3 shows the correct AudioInRoom auxiliary input connection, depending on whether a Jack analogue audio connector or an RCA connector is used:

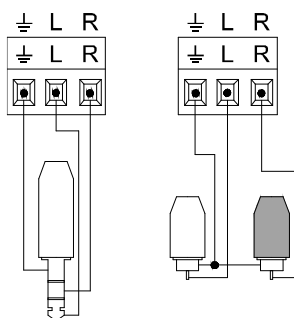


Figure 3. Auxiliary Input: Jack connector (left) and RCA connector (right).

Once the AudioInRoom is connected to an audio source, the processed audio output will take place through the **audio output channels** (10). Two independent channels with two connectors each for the speakers are available.

The following figure shows how to connect the audio output channels:

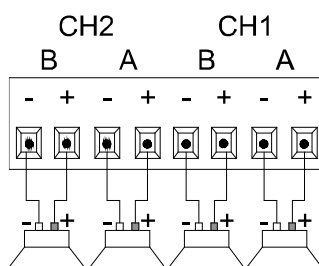


Figure 4. Audio Output Channels.

For detailed information about the technical features of the device and for safety instructions or about the installation process, please refer to the corresponding **Datasheet**, bundled with the original package of the device and also available at www.zennio.com.

1.4 BLUETOOTH CONNECTION

AudioInRoom connection with an audio source device through the Bluetooth module is a simple procedure that maintains connection security at all times when carried out using a configurable password.

1.4.1 CHECK-IN / CHECK-OUT

The 'Check-in' process represents the arrival of a new user to the room and establishes a new identifier name for the AudioInRoom and a new password or PIN to link to it. These two values are set by communication object.

Instead, the Check-out process resets the name and password to the default (parameter) settings. In addition, the list of devices linked to AudioInRoom is deleted, so that any user who wants to reconnect to AudioInRoom must repeat the pairing process.

1.4.2 PAIRING

The pairing process is initiated in AudioInRoom by sending the order via the corresponding communication object or by pressing (more than three seconds) the test button.

Once the pairing mode is activated, the AudioInRoom will remain visible via Bluetooth for approximately 30 seconds. It can be identified by the name established in the Check-In process or by the name established by parameter in ETS.

When selecting the desired AudioInRoom to connect to, the pairing PIN is requested. This PIN, again, may be the one established in the Check-in process or the one established by parameter in ETS.

After entering the PIN, the audio source device and AudioInRoom will be paired and connected:

- **Connected Device:** the device has already been paired through the security PIN and it is connected to AudioInRoom. At this point the sound from the device will be heard through the speakers connected to the AudioInRoom audio output channels. In addition, playback and volume controls can be used from the AudioInRoom

- **Paired Device:** the device has already been paired through the security PIN. However, the audio-multimedia connection has been disabled. AudioInRoom does not allow the user to play music in this state.

AudioInRoom allows up to two devices paired and connected, so that audio can be played from any of them, although, logically, not at the same time.

If a third device is paired, one of the two previous devices will be deleted, which means that it will have to be paired again if it wants to reconnect.

1.5 INICIALIZATION AND POWER TENSION

After a programming, a *Check-out* procedure is executed, which will also update the Bluetooth module with PIN and device name values set by parameter.

With a power failure, the Bluetooth connection gets lost. This causes the source device playback gets stopped. AudioInRoom has been designed so that audio source playback can be recovered in a known status.

On the other hand, a KNX bus power failure **does not imply any change in the device status since it has external power supply**. The Testing LED will red flashing for information.

2. CONFIGURATION

After importing the corresponding database in ETS and adding the device into the topology of the desired project, the configuration process begins by entering *Parameters* screen.

2.1 GENERAL

From this screen the two main functions of AudioInRoom, **Heartbeat** and **Bluetooth Module**, can be enabled.

ETS PARAMETERISATION

The configurable parameters on the General screen are the following:

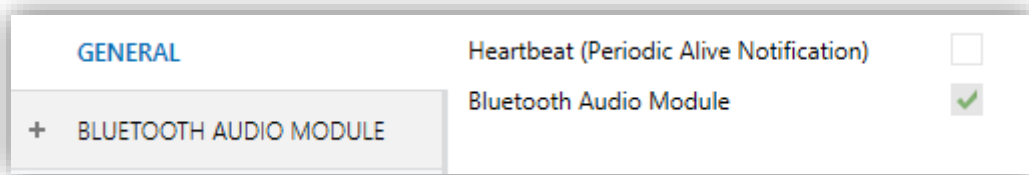


Figure 5. General Configuration.

- **Heartbeat (Periodic Alive Notification)** [[disabled/enabled](#)]¹: incorporates a one-bit object to the project (“**[Heartbeat] Object to Send ‘1’**”) that will be sent periodically with a value of “1” to notify that the device is still working (still *alive*).

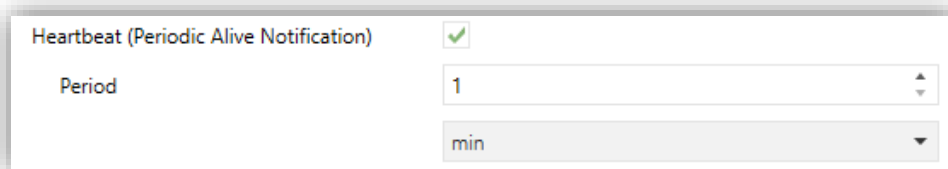


Figure 6. Heartbeat (Periodic Alive Notification).

¹ The default values of each parameter will be highlighted in blue in this document, as follows: [[default/rest of options](#)].

Note: *The first sending after download or bus failure takes place with a delay of up to 255 seconds, according to the individual address, to prevent bus overload. The following sendings match the period set.*

- **Bluetooth Audio Module** [[enabled](#)]: Bluetooth module is the main functionality of the AudioInRoom and is enabled permanently. For more information, see section 2.2.

2.2 BLUETOOTH AUDIO MODULE

AudioInRoom allows the user to control and configure the Bluetooth module so that suiting this functionality to the desired operation is possible:

- **Device Name:** customizable name for easy AudioInRoom identification while searching and pairing devices via Bluetooth.
- **PIN:** parameterisable four-digit numeric value allowing secure connection and pairing with authorized user devices.
- **Playback Channels:** audio output channels. AudioInRoom has two independent stereo channels with two setup options for audio playback mode:
 - **Stereo:** each of two tracks which form the audio signal is played through one of the speakers (or subchannels), recreating a more natural listening experience.
 - **Mono:** the two tracks sound together through each speaker (or subchannel) and it is possible even disconnecting one of these speakers without altering the audio output.
- **Playback control** using KNX objects. There are two controls:
 - **Play/Stop:** allows starting and pausing the audio playback of user device.
 - **Skip:** allows playing the next track or playing back the previous one.
- **Volume Control.** AudioInRoom volume control depends directly on the Bluetooth of the device connected. Thus, three different volume controls are possible:

- **Device Volume Control:** audio player volume control of the user device.
- **AudioInRoom Volume Control:** volume control of amplifiers of AudioInRoom, by means of a communication object.
- **[Device + AudioInRoom]:** bidirectional behaviour that makes that the signal volume of both amplifiers will be modified directly from the user device. Thus, when a volume command is sent through the communication object to the AudioInRoom, the user device audio player volume will be modified in the same way.

Regardless of the devices connected via Bluetooth, AudioInRoom allows configuring the following controls:

- **Initial Volume:** volume that will be set on each channel and/or subchannel after programming or a power loss. It is also the initial volume when the sound is played from the auxiliary input.
- **Volume Limitation:** maximum value for the output volume of each amplifier. The real output volume will be the result of adjusting the volume established by the user [0-100%] to the configured limit value, as follows:

[Limit Value] = 50%, [Control Volume Value] = 50% → [Output Volume Value] = 25%

[Limit Value] = 60%, [Control Volume Value] = 60% → [Output Volume Value] = 36%

[Limit Value] = 60%, [Control Volume Value] = 50% → [Output Volume Value] = 30%

However, this limitation is transparent to the user. In other words, the value of the volume control object is shown on the bus in any case.

- **Mute:** it is possible to mute the output volume in each channel and/or subchannel by communication object.
- **Auxiliary Input:** allows music playback from a wired audio source, without Bluetooth connection. In this case, the playback control can only be carried out from the own user device audio player.

The auxiliary input takes priority over the Bluetooth streaming.

- **Tone:** AudioInRoom has a ringtone that emits a beep through the speakers for a short period of time. The audible warning will sound even if the Bluetooth module is off.
- **Alarms:** AudioInRoom provides three high temperature warning alarms, one for each channel and one for the device itself.

When an alarm occurs, audio playback is stopped. To deactivate the alarm, it is necessary to correct the problem that generates it (probably a connection error) and unfreeze it. The object for unfreezing the alarms is common to all of them.

ETS PARAMETERIZATION

After enabling the Bluetooth audio module in the GENERAL screen (see section 2.1), a new tab will be incorporated into the tab tree on the left. The parameters available for configuring the Bluetooth module can be found in the CONFIGURATION subtab:

GENERAL	On/Off Object	<input checked="" type="checkbox"/>
- BLUETOOTH AUDIO MODULE	Device Name	Zennio AiR
	Device Name Change Object	<input checked="" type="checkbox"/>
CONFIGURATION	Customized Pairing PIN	<input checked="" type="checkbox"/>
	PIN (*)	0000
	PIN Object	<input checked="" type="checkbox"/>
	Auxiliary Input	<input type="checkbox"/>
	Volume Absolute	<input checked="" type="checkbox"/>
	Volume Relative Step	<input type="checkbox"/>
	Volume Relative Control	<input type="checkbox"/>
	Tone Volume	100 %
	Channel 1	<input checked="" type="checkbox"/>
	Configuration	<input checked="" type="radio"/> Stereo <input type="radio"/> Mono
	Initial Volume	60 %
	Volume Limitation	60 %
	Volume Limitation Object	<input type="checkbox"/>
	Volume Limitation Value Object	<input type="checkbox"/>
	Channel 2	<input type="checkbox"/>

(*) Δ [0000 ... 9999], otherwise 0000 will be downloaded

Figure 7. Audio Bluetooth Module Configuration.

- **On/Off Object** [[enabled/disabled](#)]: enables or disables the 1-bit object "[Audio] On/Off", which allows switching on / off the Bluetooth module.

Moreover, the Bluetooth module status can be checked by reading the 1-bit object "[Audio] On/Off (Status)".

- **Device Name** [[Zennio AiR](#)]: default name of the Bluetooth module to identify the AudioInRoom when pairing. This is the name set when a Check-out process is performed.

- **Device Name Change Object** [[enabled/disabled](#)]: when enabled, it is possible to change the name of the device through the 14-bytes object "[Audio][BT] Name". The name saved in this object can be checked by reading the 14-bytes objects "[Audio][BT] Name (Status)". This is the name set when a Check-in process is performed.

Note: the status object "[Audio][BT] Name (status)" does not always indicate the current device name; it indicates the name that has been recorded in the object "[Audio][BT] Name" and that will be set on the device by Check-in.

- **Customized Pairing PIN** [[enabled/disabled](#)]: when enabled, the default pairing PIN can be modified:

- **PIN** [[0000...9999](#)]: default PIN of the Bluetooth module for device pairing. This is the PIN set when a Check-out process is performed.
- **PIN Object** [[enabled/disabled](#)]: enables the 14-bytes object "[Audio][BT] PIN" to modify the PIN value. The PIN saved in this object can be checked by reading the 14-bytes objects "[Audio][BT] PIN (Status)". This is the PIN set when a Check-in process is performed.

Notas:

- If a PIN outside the allowed range [0000-9999] is entered in the "[Audio][BT] PIN" object, it is ignored and updated to the parameter-set value.
- The status object "[Audio][BT] PIN (status)" does not always indicate the current device PIN; it indicates the PIN that has been recorded in

the object "[Audio][BT] PIN " and that will be set on the device by Check-in.

- **Auxiliary Input** [[enabled/disabled](#)]: enables o disables, using the 1-bit object "[Audio] Aux. Input", the audio reception through the auxiliary input. The object "[Audio] Aux. Input (Status)" will indicate the status of that input.
- **Volume Absolute** [[enabled](#)]: volume control for each channel and/or subchannel through the 1-byte object "[Audio] Channel X: Volume Absolute" and/or "[Audio] Channel X, Subchannel Y: Volume Absolute", depending on whether the channel configuration is stereo or mono, respectively.
- **Volume Relative Step** [[enabled/disabled](#)]: step volume control for each channel and/or subchannel through the 1-byte object "[Audio] Channel X: Volume Relative Step" and/or "[Audio] Channel X, Subchannel Y: Volume Relative Step", depending on whether the channel configuration is stereo or mono, respectively.
 - **Step Size** [[100% / 50% / 25% / 12.5% / 6.25% / 3.125% / 1.5625%](#)]: value by which the volume of each channel and/or subchannel will increase or decrease when sending, respectively, "1" or "0" via the previous objects.
- **Volume Relative Control** [[enabled/disabled](#)]: gradual volume control according to the step size received by the 4-bit object "[Audio] Channel X: Volume Relative Control" and/or "[Audio] Channel X, Subchannel Y: Volume Relative Control".
 - **Speed** [[3...10](#)] [[s](#)]: regulation speed to cover the entire control range (0% ↔ 100%).

The state object "[Audio] Channel X: Volume (Status)" and/or "[Audio] Channel X, Subchannel Y: Volume (Status)" will send the updated volume value each time a change through any of the above volume controls occurs.

- **Tone Volume** [[0...100](#)] [[%](#)]: volume of the ring tone that sounds when a "0" or "1" is received through the 1-bit object "[Audio] Tone".
- **Canal X** [[enabled/disabled](#)]: when enabled, the following parameters can be configured:

- **Configuration** [[Stereo](#) / [Mono](#)]: sets the audio playback mode.
- **Initial Volume** [[0...60...100](#)] [%]: percentage of volume after programming, power failure or after enabling the auxiliary input. If the selected playback mode is “[Stereo](#)”, initial volume for **subchannel A** and **subchannel B** will be configured separately.
- **Volume Limitation** [[0...60...100](#)] [%]: maximum volume value.
 - **Volume Limitation Object** [[disabled/enabled](#)]: enables or disables the 1-bit control object “[**Audio**] Channel X: **Volume Limit**” and 1-bit status object “[**Audio**] Channel X: **Volume Limit (Status)**” for enabling or disabling the volume limitation and read the status.
 - **Volume Limitation Value Object** [[disabled/enabled](#)]: enables or disables the 1-byte control object “[**Audio**] Channel X: **Volume Limit Value**” and 1-byte status object “[**Audio**] Channel X: **Volume Limit Value (Status)**” for changing the volume limitation and read the status.

Furthermore, when a channel is enabled, the following objects are available:

- “[**Audio**] Channel X: **Mute**”: allows silencing each channel. If the “[Mono](#)” mode is set, the corresponding objects of each subchannel are also displayed: [**Audio**] Channel X, **Subchannel Y: Mute**. The mute control is independent of the volume control and takes precedence over it.
- “[**Audio**] Channel X: **Mute (Status)**” or “[**Audio**] Channel X, **subchannel Y: Mute (Status)**”: objects to consult whether the channel or subchannel are muted, respectively.
- “[**Audio**] Channel X: **Alarm (Status)**”: is sent with value '1' to warn about a high temperature in the corresponding channel.

On the other hand, the following communication objects are always available:

- “[**Audio**] **Check-in/Check-out**”: resets the Bluetooth module leaving it ready for a new user (Check-in) or returning to the default status when a user leaves (Check-out). See section 1.4.1 for details.
- “[**Audio**] **Check-in/Check-out (Status)**”: will be sent at the end of each Check-in or Check-out procedure.

- “**[Audio][BT] Pairing**”: enables (sending “0” or “1”) the pairing mode and AudioInRoom remains visible via Bluetooth for approximately 30 seconds.
- “**[Audio][BT] Disconnect**”: stops the connection of the devices to the AudioInRoom. The pairings remain.
- “**[Audio][BT] Play/Stop**”: starts (‘1’) or pauses (‘0’) the audio playback. Only for Bluetooth connection.
- “**[Audio][BT] Play/Stop (Status)**”: informs about the audio playback status. Only for Bluetooth connection.
- “**[Audio][BT] Skip**”: plays the next (‘1’) or the previous (‘0’) track. Only for Bluetooth connection.
- “**[Audio] Alarm: Overheating (Status)**” is sent with value '1' to warn about a high temperature in the device.
- “**[Audio] Unfreeze Alarms**”: allows unfreezing the alarm.
- “**[Audio] Tone**”: 1-bit object that activates (sending “0” or “1”) the ring tone.

ANNEX I. COMMUNICATION OBJECTS

- “Functional range” shows the values that, with independence of any other values permitted by the bus according to the object size, may be of any use or have a particular meaning because of the specifications or restrictions from both the KNX standard or the application programme itself.

Number	Size	I/O	Flags	Data type (DPT)	Functional Range	Name	Function
1	1 Bit		CT---	DPT_Trigger	0/1	[Heartbeat] Object to Send '1'	Sending of '1' Periodically
2	1 Bit	I	C--W-	DPT_Switch	0/1	[Audio] On/Off	0 = Off; 1 = On
3	1 Bit	O	CTR--	DPT_State	0/1	[Audio] On/Off (Status)	0 = Off; 1 = On
4	1 Bit	I	C--W-	DPT_Switch	0/1	[Audio] Check-in/Check-out	0 = Check-out; 1 = Check-in
5	1 Bit	O	CTR--	DPT_State	0/1	[Audio] Check-in/Check-out (Status)	0 = Check-out; 1 = Check-in
6	1 Bit	I	C--W-	DPT_Trigger	0/1	[Audio][BT] Pairing	Launch Pairing Mode
7	1 Bit	I	C--W-	DPT_Trigger	0/1	[Audio][BT] Disconnect	Disconnect All
8	1 Bit	I	C--W-	DPT_Enable	0/1	[Audio] Aux. Input	0 = Disable Aux. Input; 1 = Enable Aux. Input
9	1 Bit	O	CTR--	DPT_State	0/1	[Audio] Aux. Input (Status)	0 = Aux. Input Disabled; 1 = Aux. Input Enabled
10	14 Bytes	I	C--W-	DPT_String_ASCII		[Audio][BT] Name	Device Name
11	14 Bytes	O	CTR--	DPT_String_ASCII		[Audio][BT] Name (Status)	Device Name
12	14 Bytes	I	C--W-	DPT_String_ASCII	0000-9999	[Audio][BT] PIN	PIN number (0000-9999)
13	14 Bytes	O	CTR--	DPT_String_ASCII		[Audio][BT] PIN (Status)	PIN number
14	1 Bit	I	C--W-	DPT_Start	0/1	[Audio][BT] Play/Stop	0 = Stop; 1 = Play
15	1 Bit	O	CTR--	DPT_State	0/1	[Audio][BT] Play/Stop (Status)	0 = Stop; 1 = Play
16	1 Bit	I	C--W-	DPT_Step	0/1	[Audio][BT] Skip	0 = Backward; 1 = Forward
17, 39	1 Bit	I	C--W-	DPT_Enable	0/1	[Audio] Channel X: Mute	0 = Disable Mute; 1 = Enable Mute
18, 40	1 Bit	O	CTR--	DPT_State	0/1	[Audio] Channel X: Mute (Status)	0 = Mute Disabled; 1 = Mute Enabled
19, 21, 41, 43	1 Bit	I	C--W-	DPT_Enable	0/1	[Audio] Channel X, Subchannel Y: Mute	0 = Disable Mute; 1 = Enable Mute
20, 22, 42, 44	1 Bit	O	CTR--	DPT_State	0/1	[Audio] Channel X, Subchannel Y: Mute (Status)	0 = Mute Disabled; 1 = Mute Enabled
23, 45	1 Bit	I	C--W-	DPT_Enable	0/1	[Audio] Channel X: Volume Limit	0 = Disable Volume Limit; 1 = Enable Volume Limit
24, 46	1 Bit	O	CTR--	DPT_State	0/1	[Audio] Channel X: Volume Limit (Status)	0 = Volume Limit Disabled; 1 = Volume Limit Enabled
25, 47	1 Byte	I	C--W-	DPT_Scaling	0% - 100%	[Audio] Channel X: Volume Limit Value	[0 ... 100] %
26, 48	1 Byte	O	CTR--	DPT_Scaling	0% - 100%	[Audio] Channel X: Volume Limit Value (Status)	[0 ... 100] %
27, 49	1 Byte	I	C--W-	DPT_Scaling	0% - 100%	[Audio] Channel X: Volume Absolute	[0 ... 100] %

28, 50	1 Byte	O	CTR--	DPT_Scaling	0% - 100%	[Audio] Channel X: Volume (Status)	[0 ... 100] %
29, 31, 51, 53	1 Byte	I	C--W-	DPT_Scaling	0% - 100%	[Audio] Channel X, Subchannel Y: Volume Absolute	[0 ... 100] %
30, 32, 52, 54	1 Byte	O	CTR--	DPT_Scaling	0% - 100%	[Audio] Channel X, Subchannel Y: Volume (Status)	[0 ... 100] %
33, 55	1 Bit	I	C--W-	DPT_Step	0/1	[Audio] Channel X: Volume Relative Step	0 = Decrease; 1 = Increase
34, 35, 56, 57	1 Bit	I	C--W-	DPT_Step	0/1	[Audio] Channel X, Subchannel Y: Volume Relative Step	0 = Decrease; 1 = Increase
36, 58	4 Bit	I	C--W-	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0x9 (Inc. by 100%) ... 0xF (Inc. by 1%)	[Audio] Channel X: Volume Relative Control	4 Bits Relative Control
37, 38, 59, 60	4 Bit	I	C--W-	DPT_Control_Dimming	0x0 (Stop) 0x1 (Dec. by 100%) ... 0x7 (Dec. by 1%) 0x8 (Stop) 0x9 (Inc. by 100%) ... 0xF (Inc. by 1%)	[Audio] Channel X, Subchannel Y: Volume Relative Control	4 Bits Relative Control
61	1 Bit	I	C--W-	DPT_Ack	0/1	[Audio] Unfreeze Alarms	[Alarm=Inactive] + [Unfreeze=1] => End Alarm
62, 63	1 Bit	O	CTR--	DPT_Alarm	0/1	[Audio] Channel X: Alarm (Status)	0 = No Alarm; 1 = Alarm
64	1 Bit	O	CTR--	DPT_Alarm	0/1	[Audio] Alarm: Overheating (Status)	0 = No Alarm; 1 = Alarm
65	1 Bit	I	C--W-	DPT_Trigger	0/1	[Audio] Tone	Tone

Join and send us your inquiries
about Zennio devices:

<http://support.zennio.com>

Zennio Avance y Tecnología S.L.
C/ Río Jarama, 132. Nave P-8.11
45007 Toledo (Spain).

Tel. +34 925 232 002

www.zennio.com
info@zennio.com



RoHS