



# AD301R

30W Audio Amplifier DIN rail mounting



## TECHNICAL MANUAL – INSTALLATION

AD301R - Version HW 1.0 – Version FW 1.0

Made in Italy by TEMA TELECOMUNICAZIONI S.r.l.

### Recommendations

1. Use only original spare parts and consumables supplied by Tema Telecomunicazioni Srl for this equipment. The company shall not be held responsible for any damage caused by the use of materials that they have not supplied.
2. The device has been carefully manufactured and tested. In any case, the product is not recommended for use in situations in which incorrect operating may result in damage to persons and/or property.
3. We recommend that you carefully read all this manual before starting to use the device.
4. Do not expose the device to sunlight and protect it from sources of heat, dust, humidity and chemical agents.
5. This manual is the property of Tema Telecomunicazioni Srl and any duplication and reproduction, even partial, as well as storage on any type of media is forbidden without written permission from Tema Telecomunicazioni Srl.

Revision	Date	Revision reason	Prepared	Checked/Approved
2	09/05/2020	Update	DP	FL



## R&TTE DECLARATION OF CONFORMITY (DoC)

We, **TEMA TELECOMUNICAZIONI SRL** Via C. Girardengo, 1/4 - 20161 MILANO

***declare under our sole responsibility that the product:***

product name           **AD300**

trade name               **TEMA TELECOMUNICAZIONI Srl**

type or model           **AD301R, AD301, AD302, AD320/30, AD338/M, AD32**

and accessories       **AA-39D1, AA-39D3, AD330/15T, AD330/35T, AD330/40T,  
AD332/60T, AD333/30T, AD334/10T, AD335/10T, AD335/20T**

***to which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC).***

***The product is in conformity with the followings standards and/or other normative documents:***

HEALT & SAFETY   EN 60950-1:2006  
                          +A11:2009  
                          +A1:2010  
                          +A12:2011  
                          EN 62311:2008

EMC                    ETSI EN 301 489-1 V1.9.2  
                          ETSI EN 301 489-7 V1.3.1

MILANO, 16 July 2015

TEMA TELECOMUNICAZIONI SRL  
D. Pontillo

A handwritten signature in blue ink, appearing to be 'DP', is written below the printed name 'D. Pontillo'.

**I. IMPORTANT INFORMATIONS REGARDING THE RECOVERY AND RECYCLING OF THIS ELECTRONIC DEVICE**

The crossed-out wheeled bin symbol below indicates that this electronic equipment is intended to be disposed in a separate collection and not in an unsorted municipal waste, in order to provide for the treatment of WEEE (Waste Electrical and Electronic Equipment) using best available recovery and recycling techniques.

Specific treatment for WEEE is indispensable in order to avoid the dispersion of pollutants and other hazardous substances into the waste stream, while recycling leads to reduction of disposal of waste and the negative impacts on environment and human health. That is, priority is given to reuse of WEEE in its components, subassemblies and consumables.

As the final holder, the user has an important role in contributing to reuse, recycling and other forms of recovery of WEEE and is responsible to return this waste in the collection facilities set up by EC Member States and to fulfill other duties in compliance with Directive 2002/96/EC and local laws.



<b>INDEX</b>	<b>PAGE</b>
<b>1. PRESENTATION OF THE AD301R AUDIO AMPLIFIER .....</b>	<b>5</b>
<b>2. MAIN FEATURES.....</b>	<b>5</b>
<b>3. PARTS COMPRISING THE SYSTEM (PACKING LIST) .....</b>	<b>6</b>
<b>4. TECHNICAL SPECIFICATIONS.....</b>	<b>6</b>
<b>5. OPERATION .....</b>	<b>7</b>
<b>6. DESCRIPTION OF THE CONNECTION TERMINALS.....</b>	<b>8</b>
<b>7. INSTALLATION EXAMPLES.....</b>	<b>9</b>
7.1. Basic connection of the speakers .....	9
7.2. Basic connection with 4 horn speakers .....	10
7.3. Basic connection with use of the AA-10/PA and AA-11/PA interfaces to send announcement from telephone/PBX.....	11
7.4. Connection with different power speakers on the 100V speaker line.....	12

## 1. PRESENTATION OF THE AD301R AUDIO AMPLIFIER

**AD301R** is an audio amplifier designed for the audio paging of messages and music. It is housed in a standard container suitable for DIN rail mounting and has 2 audio inputs and a speaker output.

**AD301R** is ideal to realize small paging sound systems suitable for announcements in public places, hotel lounges, health centres, gyms, meeting rooms, etc.

Since it can be powered at 12V<sub>DC</sub> **AD301R** can be used in applications in mobility, boats or wherever there is a 112V<sub>DC</sub> voltage source as it can be on a vehicle equipped with a normal lead-acid battery.

**AD301R** is designed to guarantee the highest possible reproduction fidelity and is equipped with a class D final stage amplifier delivering a maximum power of 30Wrms on 4Ω when powered with a voltage of 16V<sub>DC</sub>.

The output amplifier is self-protected against the short circuit on the load and its realization with the class D technology makes it possible to install the system even directly inside an electrical panel, given the limited heat production.

**AD301R** can also be used as an additional amplifier to extend the audio range of pre-existing systems or as an auxiliary amplifier to create a PA Paging System by connecting it to one of the line outputs of a more performing model.

## 2. MAIN FEATURES

The main features of **AD301R** are:

- Extreme simple to install and use.
- Self-resetting thermal protection in case of hard conditions use.
- Self-resetting protection against short-circuit on the load (loudspeaker line).
- Supply voltage between 8V<sub>DC</sub> and 18V<sub>DC</sub> with possibility of 12V<sub>DC</sub> battery operation (the device is equipped with self-resetting internal fuse).
- High quality fidelity sound re production.
- Master volume controls, volume channels and tones realized through trimmer accessible on the device.
- Tone control realized with 2-band equalizer with +/- 12dB excursion that allows to solve most of the problems related to acoustics.
- Possibility of stereo input source that will be mixed and played in mono.
- Possibility of use with **AD320/30**, (optional 100V speaker line transformer) for cases where speakers/horns are more than 30m away from the amplifier.
- Immediately ready for use, no configuration jumper to be set.

### 3. PARTS COMPRISING THE SYSTEM (PACKING LIST)

The **AD301R** system consists of the parts included in the following list:

- One **AD301R** device (30W audio amplifier)
- One DIN rail segment
- Two anchors and two screws
- A tecnica manual (this one)

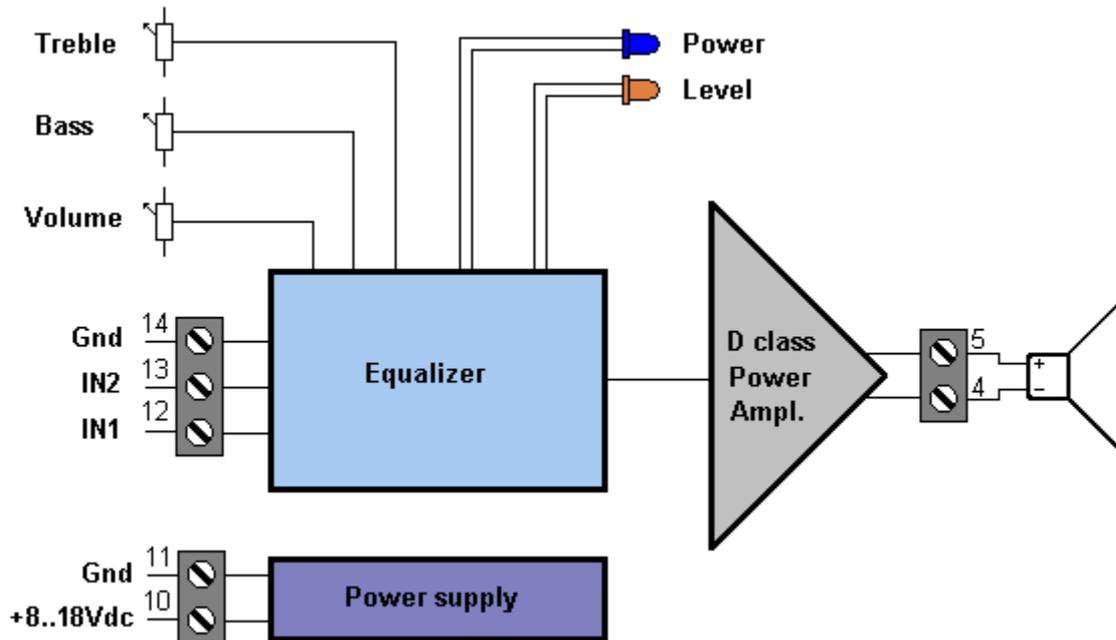
### 4. TECHNICAL SPECIFICATIONS

The following table summarizes the main technical characteristics of the system:

Power supply voltage min/max	8÷18V <sub>DC</sub>
Maximum power consumption	1.3A @ 8V <sub>DC</sub> - 2A @ 12V <sub>DC</sub> / 2.7A @ 18V <sub>DC</sub>
Maximum Power Output	30W <sub>RMS</sub> on 4Ω, @ 16V <sub>DC</sub>
Maximum speaker line length	30 mt (4Ω load) 200 mt (100V line with optional AD320/30 transformer)
Maximum efficiency	82÷90%
Minimum load impedance	4Ω
Frequency response	80Hz ÷ 15 KHz with equalizer trimmer in "flat" position 30Hz ÷ 20 KHz with appropriately adjusted equalizer trimmer
S/N ratio	Better than 90dB (20Hz ÷ 20 KHz)
Total harmonic distortion	0.05% @ 1W / 1KHz, (-68 dB 2nd harmonic, -78 dB 3rd harmonic)
Sensitivity for max power (*)	550mV <sub>RMS</sub> (Trimmer Vol at maximum, Bass and Treble in flat position)
Output voltage with 100mVpp at the input	about 2Vpp
Voltage gain	26dB
Input impedance	10KΩ
Bass equalization excursion	+/- 12dB
Treble equalization excursion	+/- 12dB
Operating temperature	da -25° a +55°
Storage temperature	da -25° a +65°
Mounting	DIN rail
Dimensions and Weight	W52 x H90 x D60 mm (3U DIN), 150 gr

## 5. OPERATION

Please refer to the following block diagram of the device to describe the system.



The "Equalizer" block realized with analog technology manages the inputs, the tone controls, the level signaling on the LED and passing the signals to the final stage of amplification, completely digital, in D class.

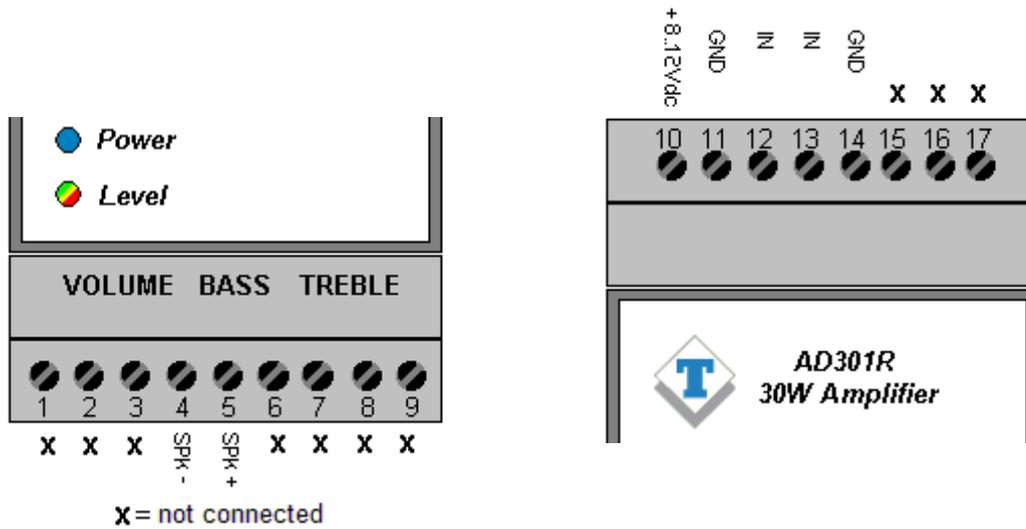
The two signals on the two inputs are mixed together (with a common level control) so that a stereo source can also be correctly distributed.

There are two LEDs, "Power" indicating the powered system and "Level" which provides a visual indication of the audio signal output to the speakers.

The Level LED flashes following the audio from when the output signal is approximately at -20dB with respect to the maximum undistorted power (meaning about 10% distortion), it is steady for signals around the maximum output level (probable 100% distortion).

It is also allowed a tone correction on the input signals to better adapt the audio to the acoustics of the environment to be sounded.

Finally, the "Power supply" block supplies the internal circuitry correctly.

**6. DESCRIPTION OF THE CONNECTION TERMINALS**

TERMINAL		DESCRIPTION
4	SPK-	<b>Negative speaker line</b> Usually the black wire of the cable to connect the speakers. *
5	SPK+	<b>Positive speaker line</b> Usually the red wire of the cable to connect the speakers. *
10	+ 8..18 V <sub>DC</sub>	<b>Positive power supply</b> Positive supply voltage, values between 8 V <sub>DC</sub> and 18 V <sub>DC</sub> . **
11	GND	<b>Negative power supply / ground</b> Negative supply voltage.
12	IN1	<b>Audio1 input (L)</b> Input of the channel 1. It is possible to connect a stereo source by connecting the L channel here. ***
13	IN2	<b>Audio2 input (R)</b> Input of the channel 2. It is possible to connect a stereo source by connecting the R channel here. ***
14	GND	<b>Audio signal Ground</b>

\* Note. When using several speakers on the same line, it is essential to connect them all with the same polarity to avoid phase inversions that attenuate the reproduction of medium-low tones.

\*\* Note. It is advisable to use the **AA-39D3** power supply. It is possible to use the **AA-39D1** power supply, obtaining however half the nominal power, which can be compensated by using horn loudspeakers that have greater efficiency and sound output. Both power supplies are stabilized ensuring absolutely no ripple voltage that otherwise negatively affect quality sound reproduction.

\*\*\* Note. The playback will take place on the only SPK output in mono mode because **AD301R** will add the channel L (IN1) and the R channel (IN2) input, ensuring the exact reproduction of the content of the stereo source.

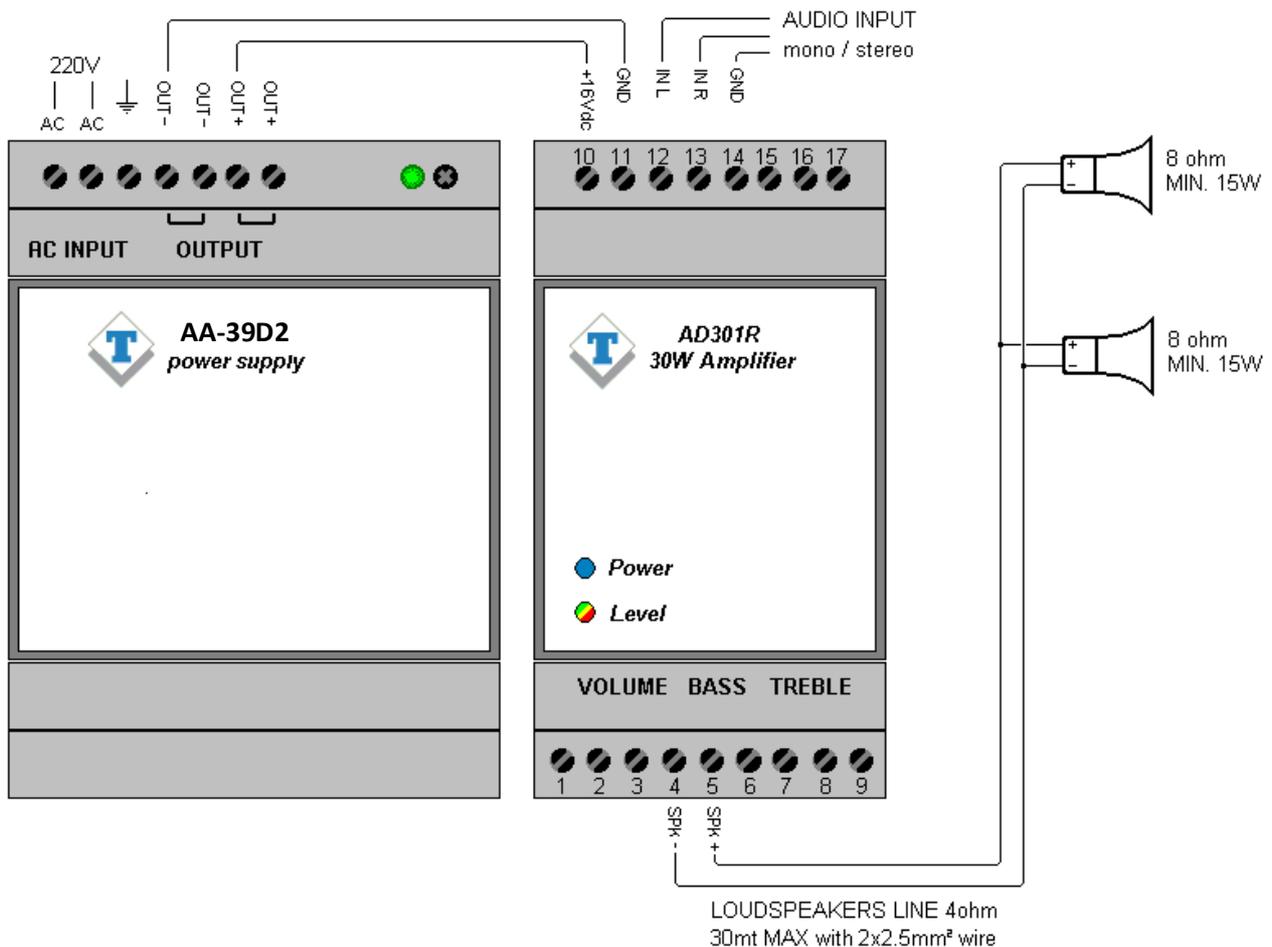
## 7. INSTALLATION EXAMPLES

### 7.1. Basic connection of the speakers 30W-4 Ohm

A simple first example of connection is the following.

In this case there are two speakers with  $8\Omega$  impedance connected in parallel and in the same polarity to the SPK outputs of terminals 4 and 5. The system is powered by the **AA-39D3** power supply able to deliver a maximum current of 3.5A at  $12V_{DC}$ .

Note that the connection of the speakers in parallel (could be the model **AD333/30T**) reduces the total impedance of the speaker system to  $4\Omega$  that however is perfectly suited to the output impedance of **AD301R** by being able to take all the available power.



## 7.2. Basic connection with 4 horn speakers 15W-8 Ohm

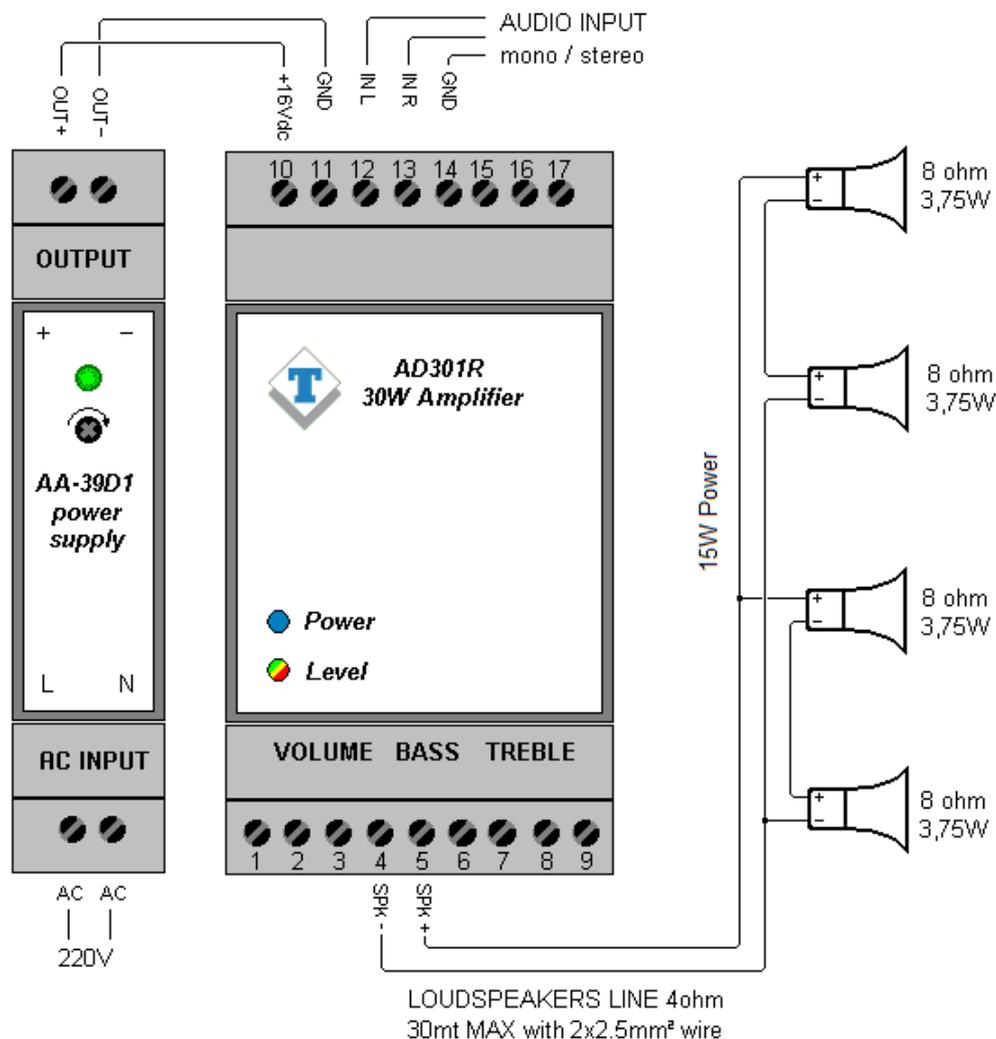
It is possible to double the number of speakers compared to the previous example in order to have a better sound distribution.

However, to comply with the characteristics of the minimum output impedance of the system (minimum 4Ω) it is necessary to adopt a series/parallel connection of the speakers, it is not possible to connect them all in parallel.

Keep in mind that if on one side the emitter surface increases (the number of speakers), on the other the impedance obtained by the new connection mode does not allow to exploit all the power that can be supplied by the amplifier but only half (in fact the impedance of the connected group results at 8Ω).

To obtain a higher sound output, it might be advisable to use horn loudspeakers instead of traditional models. The speakers could be the model **AD330/15T**.

Being in this case the power obtainable from the system limited to about 15W, it is possible to use the **AA-39D1A** power supply with a maximum current of 1.00A at 15V<sub>DC</sub> instead of the model **AA-39D2**.



### 7.3. Basic connection with use of the AA-10/PA and AA-11/PA interfaces to send announcement from telephone/PBX

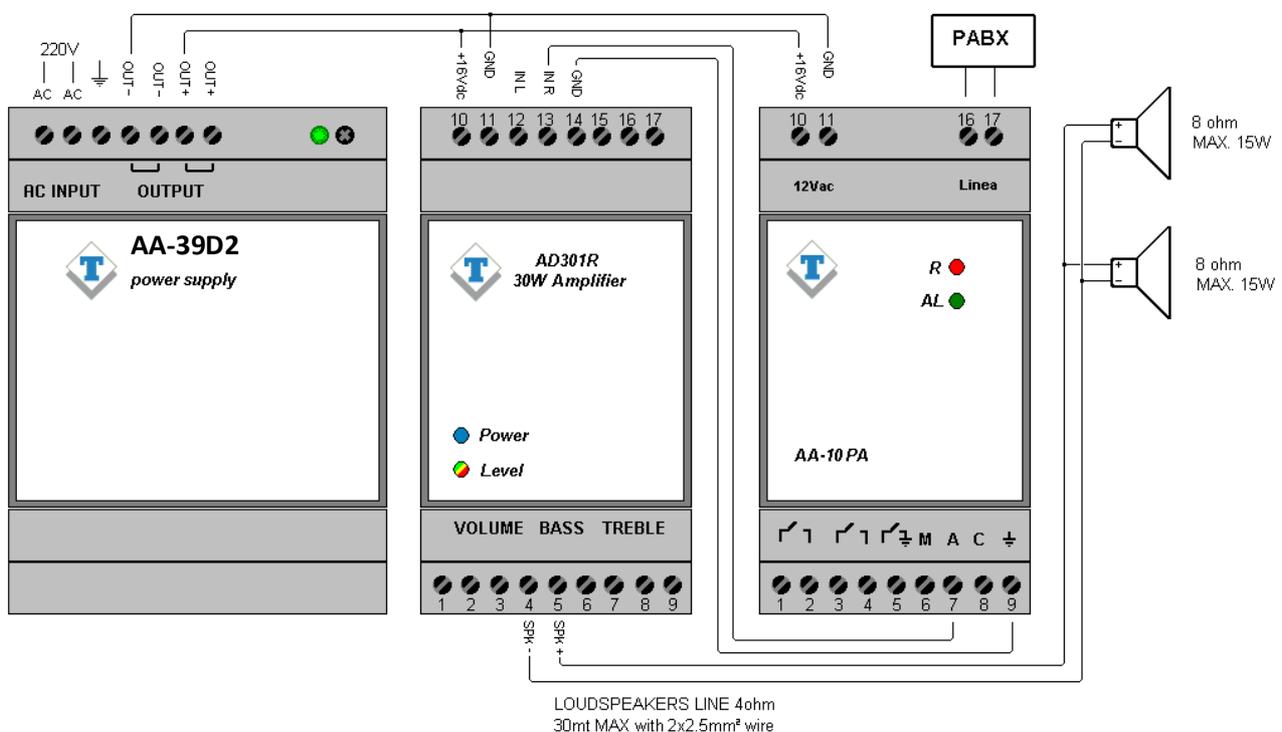
An interesting application can be the use of the TEMA **AA-10/PA** or **AA-11/PA** interfaces as the audio source, allowing to interface a telephone system with the paging sound system.

The simplest case is to connect an analog BCA telephone to the **AA-10/PA** system and at his audio output is connected to **AD301R**. The operator can then spread warning messages in the served area by the amplification system simply by lifting the phone handset and starting to speak. Upon re-hooking, the message spreading will be released.

If a PABX is available, **AA-10/PA** must be connected to an analog trunk. In this case, the interface will make it possible for all internal appropriately enabled users of the PBX, to spread a warning message by engaging the line where **AA-10/PA** is connected and starting to speak. Upon re-hooking, the message will be released.

If an internal analog extension of the PABX will be used instead of the analog trunk, the **AA-11/PA** interface must be used. The operator can then broadcast warning messages in the area served by the amplification system simply by calling the extension where the **AA-11/PA** interface is connected and starting to speak. **AA-11/PA** does not generate any warning tone at the beginning of the message output. When the handset is hung up, the message spread will be terminated after the acknowledgment by **AA-11/PA** of the PBX reorder tone. The operator can also decide to immediately terminate the call to **AA-11/PA** and then the announcement by dialing a specific DTMF command.

See the following diagram showing a typical **AD301R** connection with **AA-10/PA** connected to a PABX analog trunk:



## 7.4. Connection with different power speakers on the 100V speaker line

This connection example uses the output transformer **AD320/30** which allows to exceed the 30mt limit of cable between the amplifier and the speakers suitable to be connected to the 100V line such as horn loudspeakers **AD330/15T** and **AD330/40T** and other loudspeakers.

In this case, the amplifier behaves as if it were a small power plant that supplied the 100V speaker line.

Individual speakers will then determine how much power to take from the line. By connecting a 5W speaker to the 100V line will be reached a certain sound intensity, using a 10W speaker will be more power intensity.

All our loudspeakers are equipped with a commutator/selector or several connection terminals in order to pick up different power levels from the line and adapt the sound intensity to the area that has to be sounded.

The important thing is not to exceed the maximum power supplied by the amplifier in order not to overload it. For example if speakers using the 10W socket are connected, it is not possible to connect more than 3, but if the 5W socket is used then it is possible to connect up to 6.

It is also possible to use combinations, for example two speakers connected to 10W and two speakers connected to 5W. Obviously the speakers connected to 5W will produce a lower sound intensity.

