PPA Series Datasheet and Manual

(HW rev. 4.0)

This document covers passively and actively cooled product versions

Version 2.0

2021-07-06

Content

1. Important Safety Information

This device complies with the CE and VDE directives and fulfills the requirements of class 1 (DIN EN 62368-1:2016-05). It has been manufactured and tested with your safety in mind. However, improper use can result in potential electric shock or fire hazards.

To avoid defeating the safeguards that have been built into the device, please observe the precautions discussed in this document.

The lightning flash with arrowhead symbol, within a triangle, is intended to alert you to the presence of uninsulated “dangerous” voltages within your device’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within a triangle is intended to alert you to the presence of important instructions in the literature accompanying the device.

Warnings

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER OF THE DEVICE.

THERE ARE DANGEROUS VOLTAGES INSIDE THE UNIT EVEN WHEN MAINS IS DISCONNECTED.

THERE ARE NO USER-SERVICEABLE PARTS INSIDE IT.

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS DEVICE TO RAIN OR MOISTURE.

DO NOT PERFORM ANY SERVICING UNLESS YOU ARE QUALIFIED TO DO SO BY FOUR AUDIO.

REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

SERVICING THE DEVICE YOURSELF WILL INVALIDATE THE WARRANTY.

THIS IS A PROTECTIVE CLASS 1 DEVICE AND MUST THEREFORE BE EARTHED! NEVER DISCONNECT THE PROTECTIVE EARTH CONDUCTOR.

Ventilation

Slots and openings in the casing of the device are provided for ventilation, to ensure reliable operation of the device and to protect it from overheating.

MAKE SURE THAT ALL VENTILATION SLOTS ARE CLEAN AND FREE OF DUST.

NEVER BLOCK THE VENTILATION OPENINGS BY PLACING THE DEVICE ON A BED, SOFA, RUG OR OTHER SIMILAR SURFACE.

NEVER COVER THE VENTILATION OPENINGS WITH ITEMS SUCH AS NEWSPAPERS, CLOTHS ETC.

DO NOT PLACE THE DEVICE IN A BUILT-IN INSTALLATION SUCH AS A BOOKCASE OR RACK UNLESS PROPER VENTILATION IS PROVIDED OR YOU HAVE ADHERED TO THE MANUFACTURER’S INSTRUCTIONS.

Water and moisture

THE APPLIANCE IS BUILT FOR INDOOR USE. DO NOT USE THIS PRODUCT NEAR WATER:

DO NOT EXPLOIT IT TO HUMIDITY OR EXTREME TEMPERATURES.

ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, ARE PLACED ON THE DEVICE.

GENERAL SAFETY INSTRUCTIONS

- READ THE INFORMATION FOR USE (USER MANUAL).
- PLEASE KEEP THE USER MANUAL IN A SAFE PLACE DURING THE LIFETIME OF THE PRODUCT. THE USER MANUAL FORMS AN INTEGRAL PART OF THE PRODUCT. RESELLING OF THE PRODUCT IS ONLY POSSIBLE IF THE USER MANUAL IS AVAILABLE. ANY CHANGES MADE TO THE PRODUCT HAVE TO BE DOCUMENTED IN WRITING AND PASSED ON TO THE BUYER IN THE EVENT OF RESALE.
- HEED ALL WARNINGS.
- FOLLOW ALL INSTRUCTIONS.
- DO NOT USE THIS PRODUCT NEAR WATER (FOR EXAMPLE, IN DAMP ROOMS OR NEAR A SWIMMING POOL).
- CLEAN ONLY WITH DRY CLOTH.
- DO NOT COVER THE HEAT SINK. INSTALL IN ACCORDANCE WITH THE USER MANUAL.
- DO NOT INSTALL NEAR ANY HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, STOVES, OR OTHER APPARATUS THAT PRODUCE HEAT.
- PROTECT THE POWER CORD FROM BEING WALKED ON, PINCHED OR DAMAGED IN ANY OTHER WAY. PAY PARTICULAR ATTENTION TO PLUGS AND THE POINT WHERE THEY EXIT FROM THE AMPLIFIER UNIT.
- THE PRODUCT MAY ONLY BE USED IN ACCORDANCE WITH THE INFORMATION PROVIDED IN THE USER MANUAL.
  BEFORE AND DURING THE USAGE OF THE AMPLIFIER PLEASE ENSURE THAT ALL RECOMMENDATIONS, ESPECIALLY THE SAFETY RECOMMENDATIONS IN THE USER MANUAL, ARE ADHERED TO. THE AMPLIFIER UNIT IS DESIGNED FOR THE AMPLIFICATION OF PULSED AUDIO SIGNALS AND THE AMPLIFIER UNIT SHOULD ONLY BE CONNECTED TO SPEAKERS WITH AN AVERAGE IMPEDANCE THAT IS NOT LOWER THAN THE IMPEDANCES SPECIFIED IN THE USER'S MANUAL.
- DO NOT PLACE THE PRODUCT ON AN UNSTABLE CART, STAND, TRIPOD, BRACKET, OR TABLE. THE DEVICE MAY FALL,CAUSING SERIOUS INJURY, AND SERIOUS DAMAGE TO THE DEVICE ITSELF.
- THE AMPLIFIER UNIT CAN ONLY BE DISCONNECTED FROM THE POWER SUPPLY BY REMOVING THE PLUG, WHICH MUST BE FREELY ACCESSIBLE AT ALL TIMES. UNPLUG THIS AMPLIFIER UNIT DURING LIGHTNING STORMS OR WHEN UNUSED FOR LONG PERIODS OF TIME.
- REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

DAMAGES THAT REQUIRE SERVICE

UNPLUG THE AMPLIFIER UNIT FROM THE MAINS SUPPLY AND REFER TO YOUR DEALER/DISTRIBUTOR OR OTHER AUTHORIZED REPAIR WORKSHOP. SERVICING IS REQUIRED WHEN:

- THE POWER-SUPPLY CORD OR PLUG HAS BEEN DAMAGED.
- LIQUID HAS BEEN SPILLED OR OBJECTS HAVE FALLEN INTO THE AMPLIFIER.
- THE AMPLIFIER HAS BEEN EXPOSED TO RAIN OR MOISTURE.
- THE AMPLIFIER HAS BEEN DROPPED OR SUFFERED DAMAGE IN ANY OTHER WAY.
- THE AMPLIFIER EXHIBITS A DISTINCT CHANGE FROM ITS NORMAL FUNCTION OR PERFORMANCE.

SERVICING:

DO NOT ATTEMPT TO SERVICE THIS PRODUCT YOURSELF. AS OPENING OR REMOVING COVERS MAY EXPOSE

YOU TO DANGEROUS VOLTAGE OR OTHER HAZARDS, THE AMPLIFIER MAY ONLY BE OPENED BY QUALIFIED PERSONNEL. PLEASE REFER TO YOUR DEALER/DISTRIBUTOR.

SERVICING AND REPLACEMENT PARTS:

ALL SERVICE AND REPAIR WORK MUST BE CARRIED OUT BY AN AUTHORIZED DEALER/DISTRIBUTOR. WHEN REPLACEMENT PARTS ARE REQUIRED, PLEASE ENSURE THAT THE DEALER/DISTRIBUTOR ONLY USES REPLACEMENT PARTS SPECIFIED BY THE MANUFACTURER. THE USE OF UNAUTHORIZED REPLACEMENT PARTS MAY RESULT IN INJURY AND/OR DAMAGE THROUGH FIRE OR ELECTRIC SHOCK OR OTHER ELECTRICITY-RELATED HAZARDS.

SAFETY CHECK:

UPON COMPLETION OF ANY SERVICE OR REPAIRS TO THIS PRODUCT, ASK THE DEALER/DISTRIBUTOR TO PERFORM SAFETY CHECKS TO DETERMINE THAT THE AMPLIFIER IS IN PROPER OPERATING CONDITION.

READ THE INFORMATION FOR USE (USER MANUAL):

WHEN SHIPPING THE PRODUCT, ALWAYS USE THE ORIGINAL SHIPPING CARTON AND PACKING MATERIALS. FOR MAXIMUM PROTECTION, REPACK THE UNIT AS IT WAS ORIGINALLY PACKED AT THE FACTORY.

ENVIRONMENTS:

USE THIS PRODUCT ONLY IN E1, E2, E3 OR E4 ENVIRONMENTS ACCORDING TO EN55103-2.“ELECTROMAGNETIC COMPATIBILITY – PRODUCT FAMILY STANDARD FOR AUDIO, VIDEO AND AUDIO-VISUAL AND ENTERTAINMENTLIGHTING CONTROL APPARATUS FOR PROFESSIONAL USE – PART 2: IMMUNITY”.

VENTILATION AND HEAT SINK:

THE HEATSINK IS PROVIDED TO ENSURE RELIABLE OPERATION OF THE AMPLIFIER UNIT AND TO PROTECT IT FROM OVERHEATING.THE HEAT SINK MUST NOT BE BLOCKED OR COVERED. THIS PRODUCT SHOULD NOT BE INSTALLED UNLESS PROPER VENTILATIONIS PROVIDED OR MANUFACTURER’S INSTRUCTIONS HAVE BEEN ADHERED TO.

WATER AND MOISTURE:

DO NOT USE THIS PRODUCT NEAR WATER (FOR EXAMPLE, IN DAMP ROOMS OR NEAR A SWIMMING POOL).

CLEANING:

UNPLUG THE AMPLIFIER UNIT FROM THE WALL OUTLET BEFORE CLEANING. DO NOT USE LIQUID OR AEROSOL CLEANERS.

POWER-CORD PROTECTION:

POWER SUPPLY CORDS SHOULD BE ROUTED SO THAT THEY ARE NOT LIKELY TO BE WALKED ON OR PINCHED BY ITEMS PLACEDUPON THEM OR AGAINST THEM, PAYING PARTICULAR ATTENTION TO CORDS AND PLUGS, AND THE POINT WHERE THEY EXIT FROM THE AMPLIFIER UNIT.

LIGHTNING:

FOR ADDED PROTECTION OF THE PRODUCT DURING LIGHTNING STORMS, OR WHEN IT IS LEFT UNATTENDED AND UNUSED FOR LONG PERIODS OF TIME, UNPLUG IT FROM THE WALL OUTLET. THIS WILL PREVENT DAMAGE TO THE PRODUCT DUE TO LIGHTNING AND POWER-LINE SURGES. DISCONNECTION FROM THE MAINS POWER SUPPLY CAN ONLY BE ACHIEVED BY REMOVING THE PLUG FROM THE MAINS SOCKET AND BY EXTERNAL DISCONNECTION OF ALL POLES FROM THE MAINS.

INTERFERENCE OF EXTERNAL OBJECTS AND/OR LIQUIDS WITH THE APPLIANCE:

NEVER PUSH OBJECTS OF ANY KIND INTO THIS PRODUCT THROUGH OPENINGS AS THEY MAY TOUCH DANGEROUS VOLTAGE POINTS OR SHORT OUT PARTS THAT COULD RESULT IN A FIRE OR ELECTRIC SHOCK. NEVER SPILL LIQUID OF ANY KIND ON THE AMPLIFIER.

ACCESSORIES:

DO NOT PLACE THIS PRODUCT ON AN UNSTABLE CART, STAND, TRIPOD, BRACKET, OR TABLE. THE PRODUCT MAY FALL, CAUSING SERIOUS INJURY, AND SERIOUS DAMAGE TO THE PRODUCT. ANY MOUNTING OF THE PRODUCT SHOULD FOLLOW THE MANUFACTURER'S INSTRUCTIONS, AND SHOULD USE A MOUNTING ACCESSORY RECOMMENDED BY THE MANUFACTURER.

CONNECTING:

WHEN YOU CONNECT THE AMPLIFIER UNIT TO OTHER EQUIPMENT, TURN OFF THE POWER AND UNPLUG ALL OF THE EQUIPMENT FROM THE SUPPLY SOURCE. FAILURE TO DO SO MAY CAUSE AN ELECTRIC SHOCK AND SERIOUS PERSONAL INJURY. READ THE USER'S MANUAL OF THE OTHER EQUIPMENT CAREFULLY AND FOLLOW THE INSTRUCTIONS WHEN MAKING THE CONNECTIONS.

SOUND VOLUME:

REDUCE THE VOLUME TO MINIMUM BEFORE YOU TURN ON THE AMPLIFIER TO PREVENT SUDDEN HIGH LEVELS OF NOISE WHICH MAY CAUSE HEARING OR SPEAKER DAMAGE.

SPEAKON CONNECTORS:

WARNING: SPEAKON CONNECTORS MARKED WITH THE LIGHTNING FLASHES INDICATE HIGH VOLTAGES THAT ARE POTENTIALLY LIFE THREATENING.

WIRING TO THESE TERMINALS REQUIRES INSTALLATION BY AN INSTRUCTED PERSON AND THE USE OF READY-MADE LEADS OR CORDS.

CUSTOM WIRING SHOULD ONLY BE CARRIED OUT BY QUALIFIED PERSONNEL.

Disposal

When the end-of-life of your device is reached, do not dispose this device in the household waste. This protects our environment and saves raw materials. Return it to your distributor who will dispose it free of charge for you.

Four Audio assumes no liability for improper use of the product (e.g. operating errors, incorrect line voltage)

KEEP THIS INFORMATION FOR FUTURE REFERENCE

2. EC Declaration of Conformity

An example of this equipment has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emission (EU):	EN55103-1 (1996)
RF Immunity (EU):	EN55103-2 (1996)
Electrical Safety (EU):	EN60065 (1993)

Manufacturer's Name & Address

Four Audio GmbH & Co. KG

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Germany

Product Names

PPA2200-n-AC, PPA1600-n-AC, PPA1000-n-AC, PPA1000-n-PC, PPA500-n-AC, PPA500-n-PC

with n as number 1..4

Aachen, May-10-2017

Rainer Thaden

3. Introduction

The PPA Series provides a high-quality DSP-powered class-D amplifier solution for active loudspeakers. It features amplifier modules from Pascal ®, analogue and digital AES and optional Dante® inputs.

The PPA range covers modules with one to four output channels and either active (low-noise fan) or passive cooling. Modules with active cooling are equipped with a Powercon-True connector while passively cooled modules come with an IEC connector and a switch.

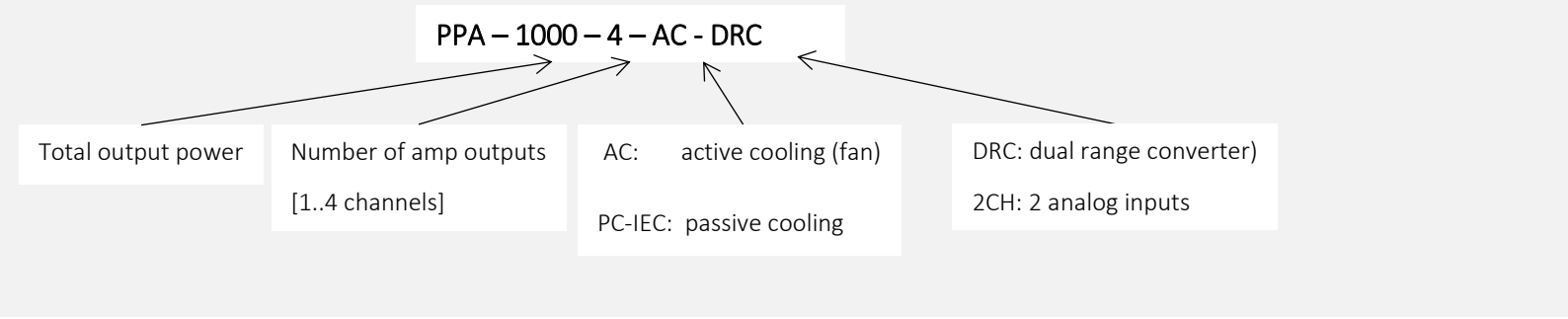


Figure 1 PPA product naming scheme

4. Product Specifications

Analog signals are converted to digital by a dual range ADC for high dynamic input range. Signal processing is done in 32-bit floating point on an Analog Devices SHARC® DSP.

In general, FIR filters are available for linear phase system response. Usual IIR X-Overs and EQs can be used instead or additionally. An advanced limiter concept protects speakers and prevents amp and PSU overheating.

The PPA is programmed via USB. The operational status of the PPA is shown on the touch display which can also be used to e.g. change presets.

Main features:

- ✓ Up to 2500 + 2x800 W Output power (PPA2200-3)
- ✓ 1..4 Channel versions available to cover a wide variety of speaker configurations
- ✓ Dante digital audio network optionally available
- ✓ 32-bit floating-point SHARC DSP
- ✓ Analog, digital AES and optional Dante® signal input
- ✓ Output channels are bridgeable to double single-channel power
- ✓ PFC (power factor correction)
- ✓ Low-noise fan or passive cooling option
- ✓ Ethernet or USB connection
- ✓ Touch screen

4.1. Cooling Concept / Housing / Power Inlet

The PPA models with active cooling use low-speed spinning fans. In some cases (Hi-Fi applications), these fans could produce an audible noise. For these applications, PPA models with passive cooling can be used. They are fanless and provide a milled aluminum backplate. The passive cooling option is available for PPA modes up to the PPA 1600-4.

The passively cooled units (**PC-IEC**) always come with a metal housing, an IEC connector and a power switch in contrast to the **AC** models which come without the metal housing and with a PowerCon True1 connector.

4.2. DRC or 2CH?

To achieve a higher signal-to-noise ratio all single input channel models use a dual-range analog-to-digital converter. It is also possible to split the dual-range converter and have two analog inputs. Please also see 6.

You can tell 2Ch from DRC models from the nr of XLR jacks. In addition to one analog input and one AES input, the 2Ch model has a third XLR jack for the second analog input.

4.3. PPA Versions

All PPA models come with **1 or 2 analog inputs** and **AES input**. Dante is optionally available.

Type	**Out. Channels**	**Pascal Amp**	**Output Power**[1]		**Total output power**[2]	**Passively cooled available?**	**Application example**
PPA...			**SE** @ 4 Ω	**BTL** (8 Ω)			
500-1	1	T-PRO1	500 W	n.a.	500 W	yes	1-way speaker or with passive XOV
500-2	2	T-PRO2	500 +150 W	n.a.	500 W	yes	2-way speaker with active XOV
500-3	3	T-PRO2 +S-A1	2x500 +150 W	n.a.	500 W	yes	2.1 system with active XOV
500-4	4	T-PRO2 +S-A2	3x500 +150 W	n.a.	500 W	yes	2.1 system with active XOV
1000-2	2	S-PRO2	2x500 W	100 W	1000 W	yes	2-way speaker with active XOV or one 1-way speaker
1000-3	3	S-PRO2 +S-A1	3x500 W	1000 W + 500 W	1000 W	yes	3-way speaker with active XOV
1000-4	4	S-PRO2 +S-A2	4x500 W	1000 W + 2x500 W	1000 W	yes	2-way speaker with BTL subwoofer
1600-2	2	L-PRO2S	2x810 W	1500 W	1500 W	yes, only	2-way speaker with active XOV
1600-4	4	L-PRO2S + L-A2	4x810 W	1500 W	1500 W	yes, only	2-way speaker with BTL subwoofer
2200-1	1	X-PRO1	2500 W	1000 W	2200 W	no	subwoofer
2200-2	2	X-PRO2	2500 +700 W		2200 W	no	2-way speaker with active XOV
2200-3	3	X-PRO3	2500 +2x800 W	2x1500 W	2200 W	no	2.1 system: Subwoofer and two tops with passive XOV or 3-way active XOV speaker

[1] Amplifier output power, total output power is limited by the power supply unit
[2] Maximum output of power supply unit

5. Technical data

5.1. PPA500-Series

	PPA500-1	PPA500-2	PPA500-3	PPA500-4
Power Amp section				
Pascal Module(s)	T-PRO1	T-PRO2	T-PRO2+S-A1	T-PRO2+S-A2
Total module output power (limited by power supply)	520 / 470 W (230/120 V)			
Number of amplifier channels	1	2	3	4
Single channel output power (1% THD+N, 1kHz)	Ch. 1, 3, 4: 245 W at **8 Ω** Ch. 2: 120 W at **16 Ω**			
Single channel output power (1% THD+N, 1kHz)	Ch. 1, 3, 4: 500 /430 W (230/120 V) at **4 Ω** Ch. 2: 220 W at **8 Ω**			
Peak output current	Ch. 1,3,4: 30 A, Ch. 2: 11 A			
Peak output voltage (SE)	±70 V (equals RMS value of 36 dBu)			
Peak output voltage (BTL)				±140 V
THD+N (1kHz, 1W, 8 Ω)	0,003 %			
Dynamic range	A-weighted: 120 dB, unweighted: 118 dB			
Output idle noise	**All channels**: 53 μV_{RMS} / -83.3 dBu unweighted, 41 μV_{RMS} / -85.5 dBu A-weighted			
Output impedance				
Protection	Over current, DC, temperature, high frequency			
DSP section				
Max. input level	+22.9 dBu			
Total system gain with flat DSP preset (no signal processing)	14.5 dB			
Analog input SNR	128 dB(A)			
Output SNR	112 dB(A)			
Limiters	(Dual-band) Look ahead peak limiter, thermal limiter, overall power supply limiter			
EQ	Low-/Highpass 6 and 12 dB, Bell filter, allpass, shelving filter 6 dB and 12 dB			
Crossovers	Bessel, Butterworth, Linkwitz-Riley, Critical			
Other DSP features	input delay, output delay, phase inversion, gain			
FIR	Linear phase X-over and linear phase loudspeaker equalization			
Connectors				
Analog in 1	balanced XLR (input impedance 20 kΩ)			
Analog in 2 (optional)	n.a.	n.a.	balanced XLR (input impedance 20 kΩ)	balanced XLR (input impedance 20 kΩ)
Digital AES in	XLR			

Dante ® (optional)	RJ45			
USB	USB Type B for configuration, preset generation etc. use Four Audio PPA software			
Ethernet	RJ45 connector, 100Mbit connection, DHCP / static- or local IP (169.254…)			
Mains in	AC models: Neutrik PowerCon True PC models: IEC input with switch			
General				
Mains input voltage	85 VAC – 265 VAC, 45-65 Hz			
Idle power consumption	t.b.a	17 W	t.b.a	t.b.a
Dimensions (WxH)	AC version: 135x324 mm PC version: 135x306 mm		AC version: 135x405 mm PC version: 135x386 mm	
weight	t.b.a	t.b.a	t.b.a	t.b.a

All data are subject to change without notice

For more details about the power amp section please consult Pascal's datasheets which are available at http://pascal-audio.com/amplifier-modules.html

5.2. PPA1000-Series

	PPA1000-2	PPA1000-3	PPA1000-4
Power Amp section			
Pascal Module(s)	S-PRO2	S-PRO2+S-A1	S-PRO2+S-A2
Total module output power (limited by power supply)	1000 / 700 W (230/120 V)		
Number of amplifier channels	2	3	4
Single channel output power at 8 Ω load (1% THD+N, 1kHz)	245 W		
Single channel output power at 4 Ω load (1% THD+N, 1kHz)	490 W		
Single channel output power at 2.7 Ω load (1% THD+N, 1kHz)	725 / 600 W (230/120 V)		
BTL (Ch1-Ch2) output power at 8 Ω load (1% THD+N, 1kHz)	900 / 700 W (230/120 V)		
BTL (Ch1-Ch2) output power at 4 Ω load (1% THD+N, 1kHz)	1050 / 700 W (230/120 V)		
Peak output current	30 A		
Peak output voltage (SE)	±70 V (equals RMS value of 36 dBu)		
Peak output voltage (BTL)	±140 V (equals RMS value of 42 dBu)		
THD+N (1kHz, 1W, 8 Ω)	0.003 %		
Dynamic range	**SE:** A-weighted: 120 dB, unweighted: 118 dB **BTL:** A-weighted: 124 dB, unweighted: 122 dB		
Output idle noise	**SE:** 60 μV_{RMS} / -82.2 dBu unweighted, 44 μV_{RMS} / -84.9 dBu A-weighted **BTL:** 75 μV_{RMS} / -80.3 dBu unweighted, 55 μV_{RMS} / -83 dBu A-weighted		
Output impedance (1 kHz, SE)	14 mΩ		
Protection	Over current, DC, temperature, high frequency, clip limiter		
DSP section			
Max. input level	+22.9 dBu		
Total system gain with flat DSP preset (no signal processing)	14 dB/ 20dB (SE/BTL)		
Analog input SNR	128 dB(A)		
Output SNR	112 dB(A)		
Limiters	(Dual-band) Look ahead peak limiter, thermal limiter, overall power supply limiter		

EQ	Low-/Highpass 6 and 12 dB, Bell filter, allpass, shelving filter 6 dB and 12 dB		
Crossovers	Bessel, Butterworth, Linkwitz-Riley, Critical		
Other DSP features	input delay, output delay, phase inversion, gain		
FIR	Linear phase X-over and linear phase loudspeaker equalization		
Connectors			
Analog in 1	balanced XLR (input impedance 20 kΩ)		
Analog in 2	optionally balanced XLR (input impedance 20 kΩ)		
Digital AES in	XLR		
Dante ® (optional)	RJ45		
USB	USB Type B for configuration, preset generation etc. use Four Audio PPA software		
Ethernet	RJ45 connector, 100Mbit connection, DHCP / static- or local IP (169.254…)		
mains in	AC models: Neutrik PowerCon True PC models: IEC input with switch		
General			
Mains input voltage	85 VAC – 265 VAC, 45-65 Hz		
Idle power consumption	11.2 W	14.6 W	16.5 W
Dimensions (WxH)	AC version: 135x380 mm PC version: 135x331 mm	AC version: 135x452 mm PC version: 135x411 mm	
weight	1,45 kg	2,1 kg	t.b.a

All data are subject to change without notice

For more details about the power amp section please consult Pascal's datasheets which are available at http://pascal-audio.com/amplifier-modules.html

5.3. PPA1600-Series

	PPA1600-2	PPA1600-4
Power Amp section		
Pascal Module(s)	L-PRO2S	L-PRO2S+L-A2
Total module output power (limited by power supply)	1500 / 1500 W (230/120 V)	
Number of amplifier channels	2	4
Single channel output power at 8 Ω load (1% THD+N, 1kHz)	410 W	
Single channel output power at 4 Ω load (1% THD+N, 1kHz)	810 W	
Single channel output power at 2.7 Ω load (1% THD+N, 1kHz)	1200 / 1200 W (230/120 V)	
BTL (Ch1-Ch2) output power at 6.67 Ω load (1% THD+N, 1kHz)	1500 / 1500 W (230/120 V)	
BTL (Ch1-Ch2) output power at 4 Ω load (1% THD+N, 1kHz)	1400 / 1400 W (230/120 V)	
Peak output current	40 A	
Peak output voltage (SE)	±84.5 V (equals RMS value of 37,7 dBu)	
Peak output voltage (BTL)	±160 V (equals RMS value of 43,3 dBu)	
THD+N (1kHz, 1W, 8 Ω)	0.0028 %	
Dynamic range	**SE:** A-weighted: 120 dB, unweighted: 118 dB **BTL:** A-weighted: 123,6 dB, unweighted: 121,4 dB	
Output idle noise	**SE:** 73 μV_{RMS} / -80.5 dBu unweighted, 54 μV_{RMS} / -83.1 dBu A-weighted **BTL:** 96 μV_{RMS} / -78.2 dBu unweighted, 75 μV_{RMS} / -80.3 dBu A-weighted	
Output impedance (1 kHz, SE)	6.5 mΩ	
Protection	Over current, DC, temperature, high frequency, clip limiter	
DSP section		
Max. input level	+22.9 dBu	
Total system gain with flat DSP preset (no signal processing)	15.6 dB/ 21.6dB (SE/BTL)	
Analog input SNR	128 dB(A)	

Output SNR	112 dB(A)	
Limiters	(Dual-band) Look ahead peak limiter, thermal limiter, overall power supply limiter	
EQ	Low-/Highpass 6 and 12 dB, Bell filter, allpass, shelving filter 6 dB and 12 dB	
Crossovers	Bessel, Butterworth, Linkwitz-Riley, Critical	
Other DSP features	input delay, output delay, phase inversion, gain	
FIR	Linear phase X-over and linear phase loudspeaker equalization	
Connectors		
Analog in 1	balanced XLR (input impedance 20 kΩ)	
Analog in 2	optionally balanced XLR (input impedance 20 kΩ)	
Digital AES in	XLR	
Dante ® (optional)	RJ45	
USB	USB Type B for configuration, preset generation etc. use Four Audio PPA software	
Ethernet	RJ45 connector, 100Mbit connection, DHCP / static- or local IP (169.254…)	
mains in	AC models: Neutrik PowerCon True PC models: IEC input with switch	
General		
Mains input voltage	85 VAC – 265 VAC, 45-65 Hz	
Idle power consumption	t.b.a.	t.b.a.
Dimensions (WxH)	AC version: 135x380 mm PC version: 135x331 mm	AC version: 135x452 mm PC version: 135x411 mm
weight	2,65 kg	t.b.a.

All data are subject to change without notice

For more details about the power amp section please consult Pascal's datasheets which are available at http://pascal-audio.com/amplifier-modules.html

5.4. PPA 2200-Series

	PPA2200-1	PPA2200-2	PPA2200-3
Power Amp section			
Pascal Module(s)	X-PRO1	X-PRO2	X-PRO3
Total module output power (limited by power supply)	2200 / 2100 W (230/120 V)		
Number of amplifier channels	1	2	3
Single channel output power at 8 Ω load (1% THD+N, 1kHz)	1550 / 1500 W (230/120 V)	Ch. 1: 1550 / 1500 W (230/120 V); Ch. 2: 400 W	Ch. 1: 1550 / 1500 W (230/120 V); Ch. 2,3: 400 W
Single channel output power at 4 Ω load (1% THD+N, 1kHz)	2000 W	Ch. 1: 2000 W Ch. 2: 800 W	Ch. 1: 2000 W Ch. 2,3: 800 W
BTL (Ch1-Ch2) output power at 8 Ω load (1% THD+N, 1kHz)			
Peak output current	30 A	Ch. 1: 30 A; Ch. 2: 21 A	Ch. 1: 30 A; Ch. 2,3: 21 A
Peak output voltage	RL = 4 Ω : 160 V RL = 8 Ω : 120 V	Ch. 1: RL = 4 Ω : 160 V RL = 8 Ω : 120 V Ch. 2: 80 V	Ch. 1: RL = 4 Ω : 160 V RL = 8 Ω : 120 V Ch. 2,3: 80 V
THD+N (1kHz, 1W, 8 Ω)	0.003 %		
Dynamic range (all channels)	A-weighted: 120 dB, unweighted: 118 dB		
Output idle noise (SE)	**Ch. 1**: 140 μV_{RMS} / -75 dBu unweighted, 110 μV_{RMS} / -77 dBu A-weighted **Ch. 2,3**: 75 μV_{RMS} / -80.3 dBu unweighted, 55 μV_{RMS} / -83 dBu A-weighted		
Output idle noise (BTL)			
Output impedance (1 kHz, SE)	Ch. 1: 11 mΩ, Ch. 2,3: 6 mΩ		
Protection	Over current, DC, over/under voltage, temperature, high frequency, main-fuse-prot., Excessive power control (XPC) (X-Pro only)		
DSP section			
Max. input level	+22.9 dBu		
Total system gain with flat DSP preset (no signal processing)	**Ch 1**: 21.2 dB **Ch 2, 3**: 15.2 dB		
Analog input SNR	128 dB(A)		
Output SNR	112 dB(A)		
Limiters	(Dual-band) Look ahead peak limiter, thermal limiter, overall power supply limiter		

EQ	Low-/Highpass 6 and 12 dB, Bell filter, allpass, shelving filter 6 dB and 12 dB		
Crossovers	Bessel, Butterworth, Linkwitz-Riley, Critical		
Other DSP features	input delay, output delay, phase inversion, gain		
FIR	Linear phase X-over and linear phase loudspeaker equalization		
Connectors			
Analog in 1	balanced XLR (input impedance 20 kΩ)		
Analog in 2 (optional)	n.a.	n.a.	balanced XLR (input impedance 20 kΩ)
Digital AES in	XLR		
Dante ® (optional)	RJ45		
USB	USB Type B for configuration, preset generation etc. use Four Audio PPA software		
Ethernet	RJ45 connector, 100Mbit connection, DHCP / static- or local IP (169.254…)		
mains in	Neutrik PowerCon True		
General			
Mains input voltage	85 VAC – 265 VAC, 45-65 Hz		
Idle power consumption	t.b.a.	t.b.a.	t.b.a.
Dimensions (WxH)	205x470.5 mm	205x510.5 mm	205x550 mm
Recommended mounting volume (WxHxD)	t.b.a	t.b.a	t.b.a
weight	4,85 kg	4,85 kg	4,85 kg

All data are subject to change without notice

For more details about the power amp section please consult Pascal's datasheets which are available at http://pascal-audio.com/amplifier-modules.html

6. Block Diagram of Signal Processing

For the analog inputs, both available configurations are shown. The **D**ual **R**ange **C**onverter (green box)uses the same input signal with different gains at the two A/D Converter channels. The DRC algorithm in the DSP decides which of the signals is to be used to achieve the best signal-to-noise ratio.

The Dual Input configuration is optional. It can be used e.g. for stereo-setups where the amplifier for left and right channel is built in into one speaker (e.g. 2.1 configuration with passive satellite speakers)

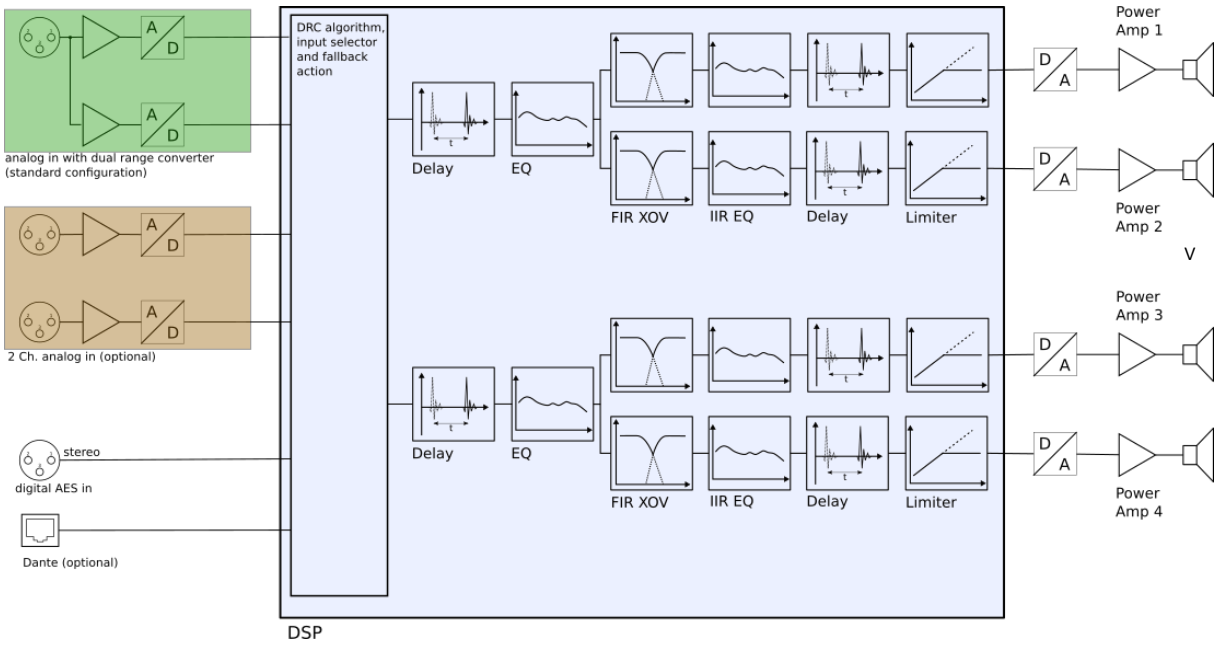


Figure 2 Signal Processing Block Diagram

7. Loudspeaker Connections

Follow these instructions to connect your speaker chassis to the amplifier module.

For better EMC compliance, use a ferrite on the speaker wires to reduce radiated emissions. For example, a 74270095 from Wuerth can be used. Wind all speaker wires 2 times through the ferrite. Place the ferrite close to the amplifier module speaker output connector as shown in Figure 3.

All cables shall be kept as far away from the PCB as possible. Avoid running cables across the power amplifier module and use twisted pair speaker cables (Figure 4). [Information and pictures in this chapter taken from S-PRO2 Application manual 1.11]

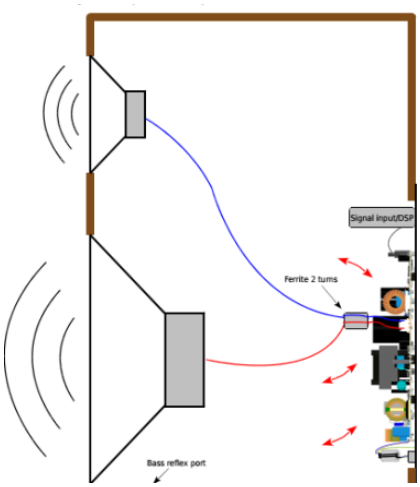


Figure 3 Ferrite in Speaker Wires

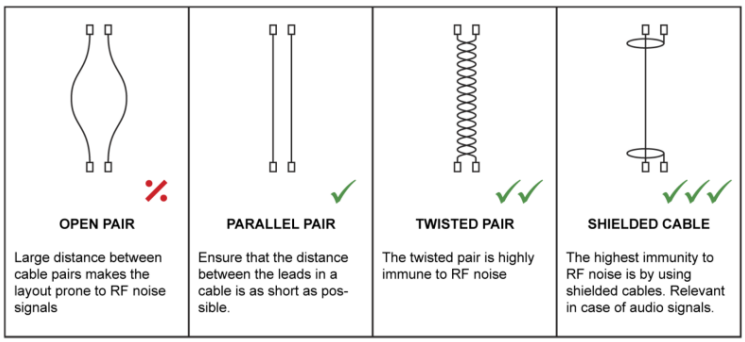


Figure 4 Proper Cabling

If you intend to make speaker signals accessible externally, you'll have to print a lightning flash with arrow head symbol next to the speaker socket to indicate high voltage. See Figure 5.

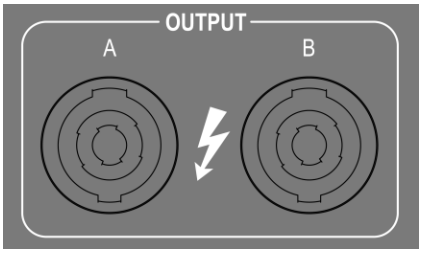


Figure 5 Lightning Flash Symbol for Speaker Connectors

7.1. PPA500 / 1000 / 1600 (Pascal® T-/ S-PRO / L-PRO2S Module)

Use JST-VH series connectors for the speaker output socket

- ✓ Speaker Female connector: JST VHR-4N (Farnell 630494)
- ✓ Crimp Pin: JST SVH-21T-P1.1 or SVH-41T-P1.1 (Farnell 630500)

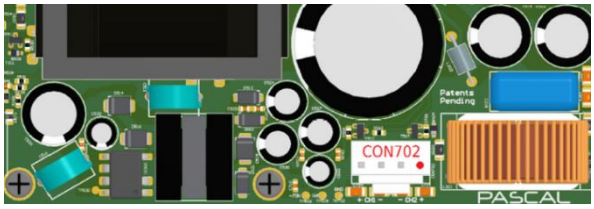


Figure 6 PPA1000 / S-PRO2 location of CON702

Table 1 PPA1000 / S-PRO CON702 connector

Connector	Pin	Description
CON702	1 (red dot in Figure 6)	**CH2 GND** This pin is used for the GND signal of the channel 2 speaker
CON702	2	**CH2 OUT+** The amplified speaker signal of channel 2 is available on this pin
CON702	3	**CH1 GND** This pin is used for the GND signal of the channel 1 speaker.
CON702	4	**CH1 OUT+** The amplified speaker signal of channel 1 is available on this pin.

The S-PRO2 / L-PRO2S channel 1 and 2 are single ended amplifier designs, which can pump back energy to the power supply rails. At low frequencies, this may cause asymmetrical power supply voltage rails, resulting in premature clipping of the amplifier outputs or over-voltage protection of the power supply.

When both channels are used, audio input for the S-PRO2 / L-PRO2S channel 2 should be inverted as shown on Figure 7. This will prevent the supply pumping between the two channels.

In order to maintain correct output phasing in Single Ended mode, the output of channel 2 should be phase inverted by interchanging the + and – connections for the speaker. Phase inversion can be set in the software.

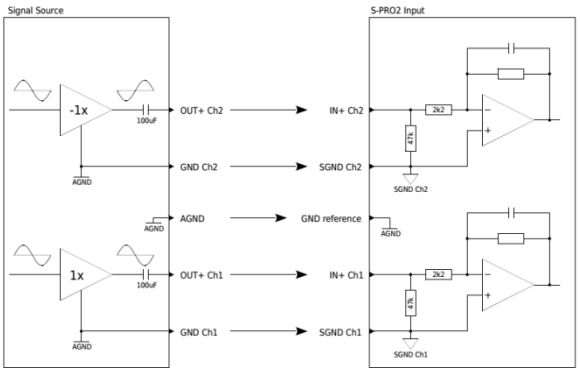


Figure 7 Inversion of 2nd Channel to Prevent Power Supply Pumping

7.1.1. Connectors at PC-IEC Units with Metal Housing

Passively cooled versions of the PPA modules (PC-IEC) come with a metal housing where the speaker connectors of the Pascal modules are wired to connectors at the metal housing. See below an example for a PPA 1600-4 PC-IEC module.

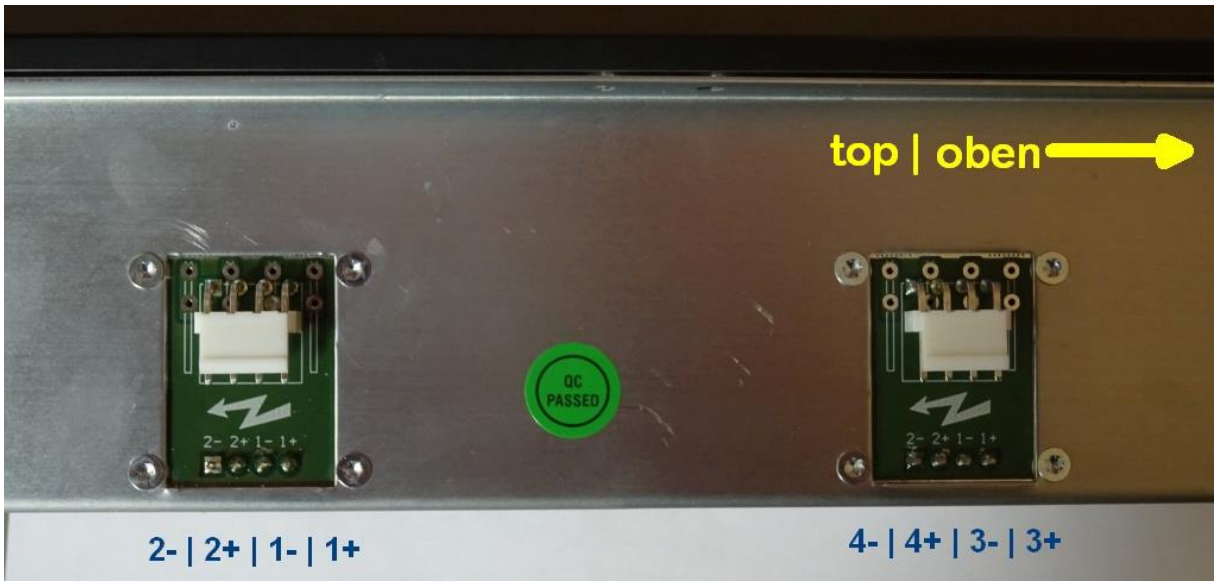


Figure 8 Speaker connectors (JST) at a PPA 1600-4 PC-IEC module

7.2. PPA2200-1 to 3 / Pascal® X-PRO1 to 3

Use the following parts for the speaker output sockets:

- ✓ Cable connector housing Molex 42021-2A (Farnell 1393363)
- ✓ Cable connector pin Molex MLX 42024 (Farnell 2396371)

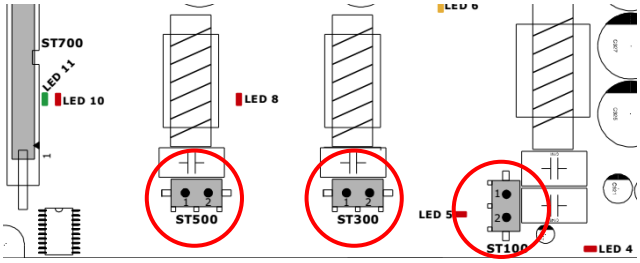


Figure 10 PPA2200 / X-PRO Location of Speaker Sockets

Differences between the X-PRO 1…3 series amplifiers:

- ✓ X-PRO1 has one bridged channel
- ✓ X-PRO2 = X-PRO1 plus a single-ended channel
- ✓ X-PRO3 = X-PRO1 plus two single-ended channels

Note: The following section applies only for X-PRO3.

The X-PRO3 channel 2 and 3 are single ended amplifier designs which can return energy to the power supply. At low frequencies, this can cause asymmetrical power supply voltage rails resulting in premature clipping of the amplifier outputs or over-voltage protection of the power supply. When channel 2 and 3 are used to amplify low frequency signals, e.g. with monitors, please take the following actions:

The input for channel 2 should be inverted. Simultaneously, phase inversion must be set in the software. This will prevent the supply pumping between channel 2 and 3. In order to have outputs of channel 2 and channel 3 in phase, the output of channel 2 should be phase inverted by interchanging the + and – connections for the speaker (see the drawing below). Tests can be carried out to verify that over-voltage protection is not engaged by disconnecting the load on channel 1 and driving the tops on channel 2 and 3 only.

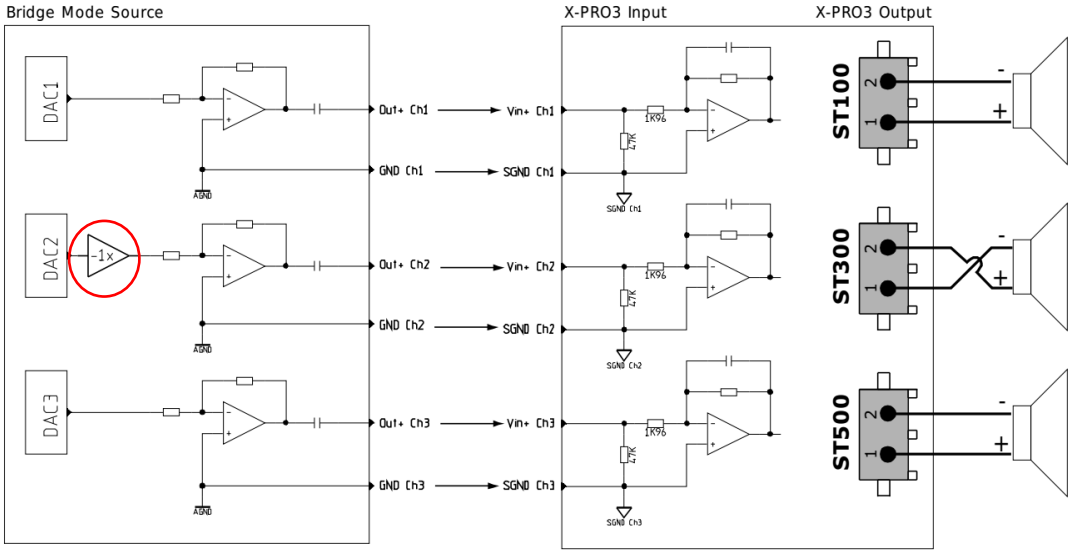


Figure 11 X-PRO3 Setup with Inverted Channel 2

7.2.1. Bridging

For **BTL** use following setup: The channel 2 signal is the inverted channel 1 signal. Connect the speaker to ST500 Pin 1 for hot and ST300 Pin 1 for cold.

Remember: Bridging is only possible for X-PRO3 on channels 2 and 3!

Table 2 PPA2200 / X-PRO speaker connection (ST100, 300, 500)

Connector	Pin	Description
ST100	1	**CH1 OUT+** The amplified speaker signal of channel 1 is available on this pin
ST100	2	**CH1 OUT-** This pin is used for the GND signal of the channel 1 speaker
ST300	1	**CH2 OUT+** The amplified speaker signal of channel 2 is available on this pin
ST300	2	**CH2 GND** This pin is used for the GND signal of the channel 2 speaker
ST500	1	**CH3 OUT+** The amplified speaker signal of channel 3 is available on this pin
ST500	2	**CH3 GND** This pin is used for the GND signal of the channel 3 speaker

8. Preset or Source Selector

If you intend to implement a preset or an input source selector use ST8 (MicroMatch). Connect a Gray-coded encoder with max. 15 positions. Four Audio is able to provide encoders and PCBs.

Figure 12 shows the pinout of ST8. Terminal 1..4 are used to select input source, terminal 5..8 select the preset.

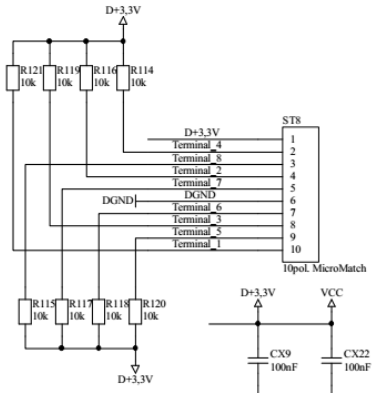


Figure 12 ST8 Pinout

Table 3 selector truth table (low-active)

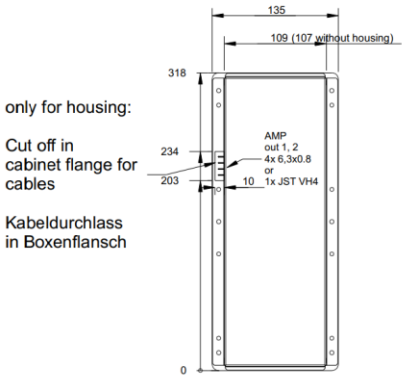
Preset No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Term.inal 1 / 5	•	•			•	•			•	•			•	•	
Terminal 2 / 6		•	•	•	•					•	•	•	•		
Terminal 3 / 7				•	•	•	•	•	•	•	•				
Terminal 4 / 8								•	•	•	•	•	•	•	•

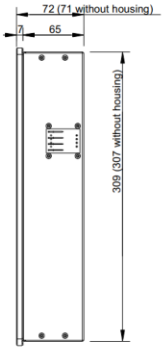
Note: Make sure to pull unused pins to DGND (Pin 6).

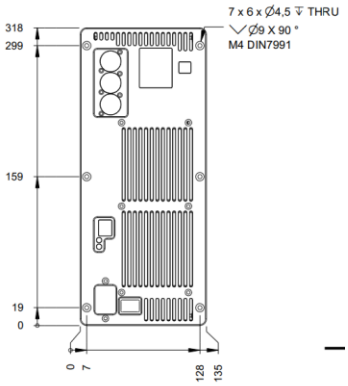
9. CAD Drawings

For PDF or DXF files of the drawings send requests to info@four-audio.com.

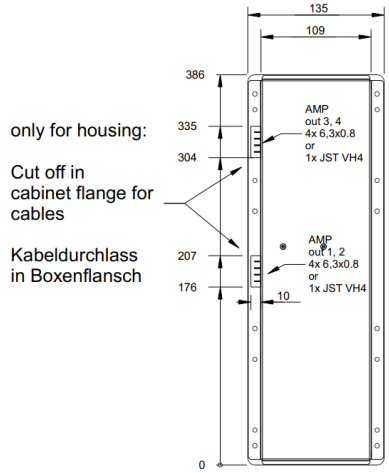
9.1. PPA 500-2 PC-IEC

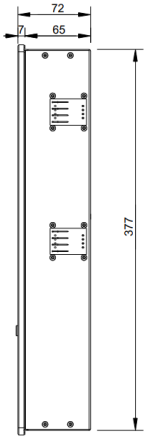


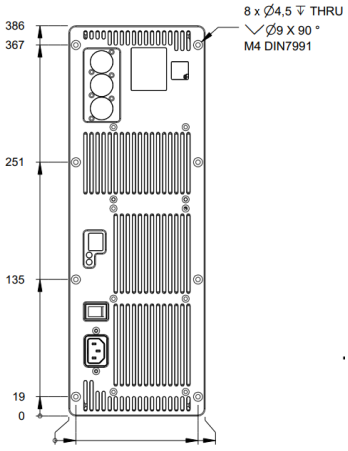




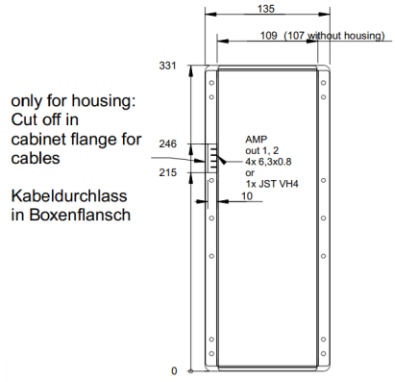
9.2. PPA 500-3/-4 PC-IEC

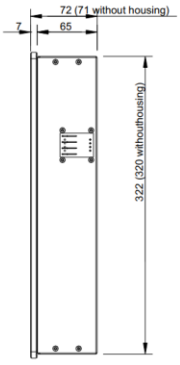


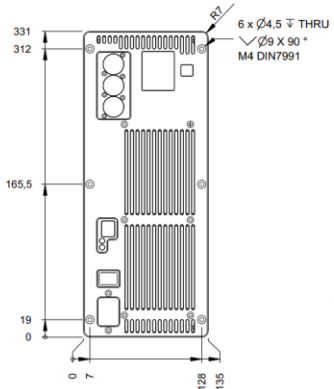




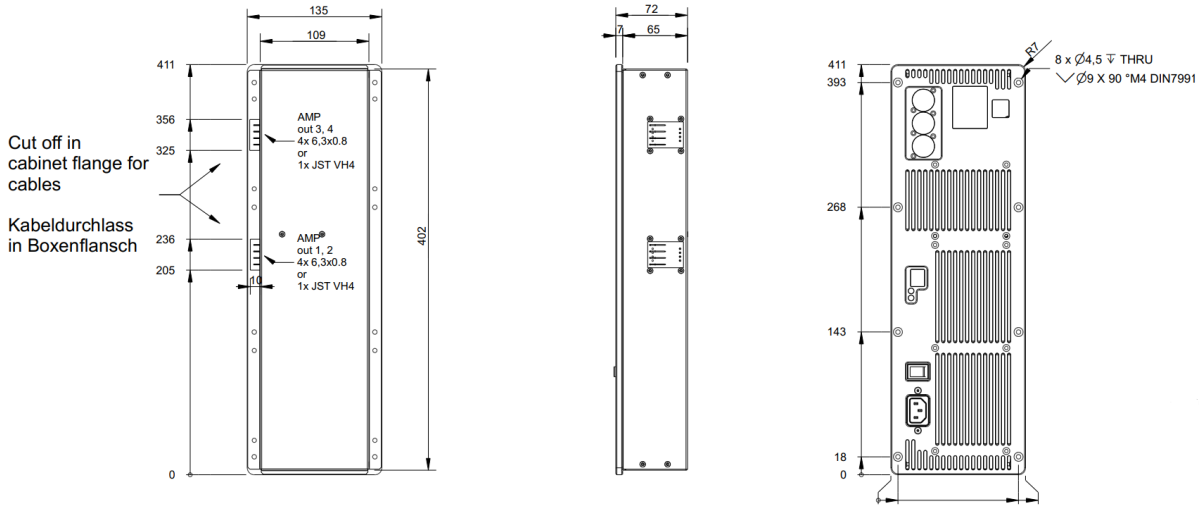
9.3. PPA 1000-2 PC-IEC



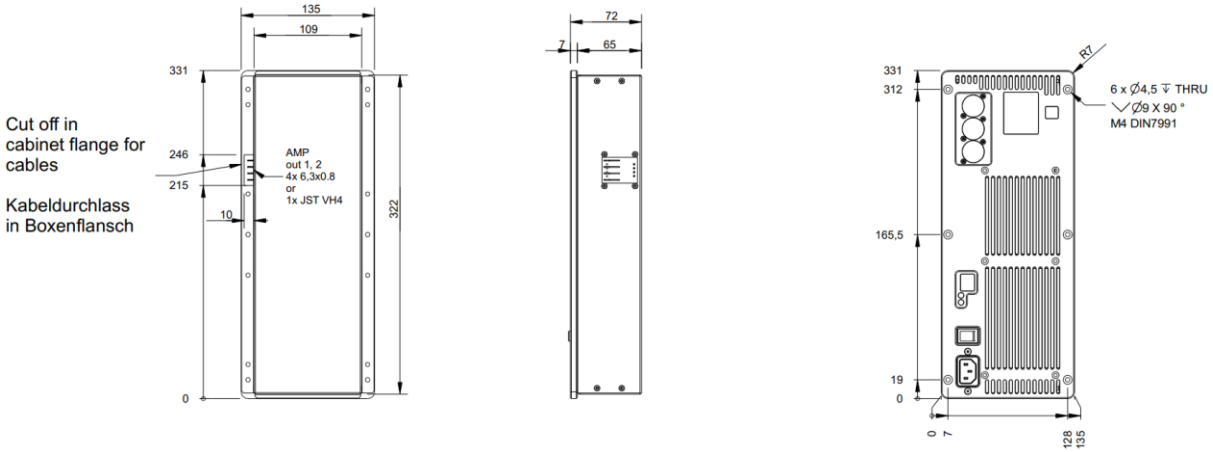




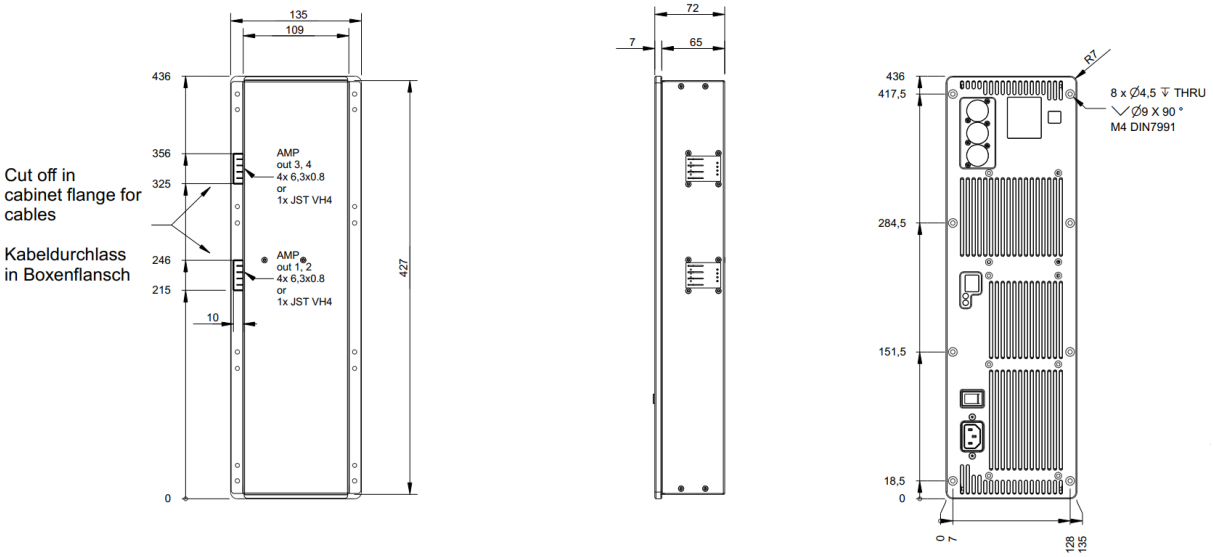
9.4. PPA 1000-3/-4 PC-IEC



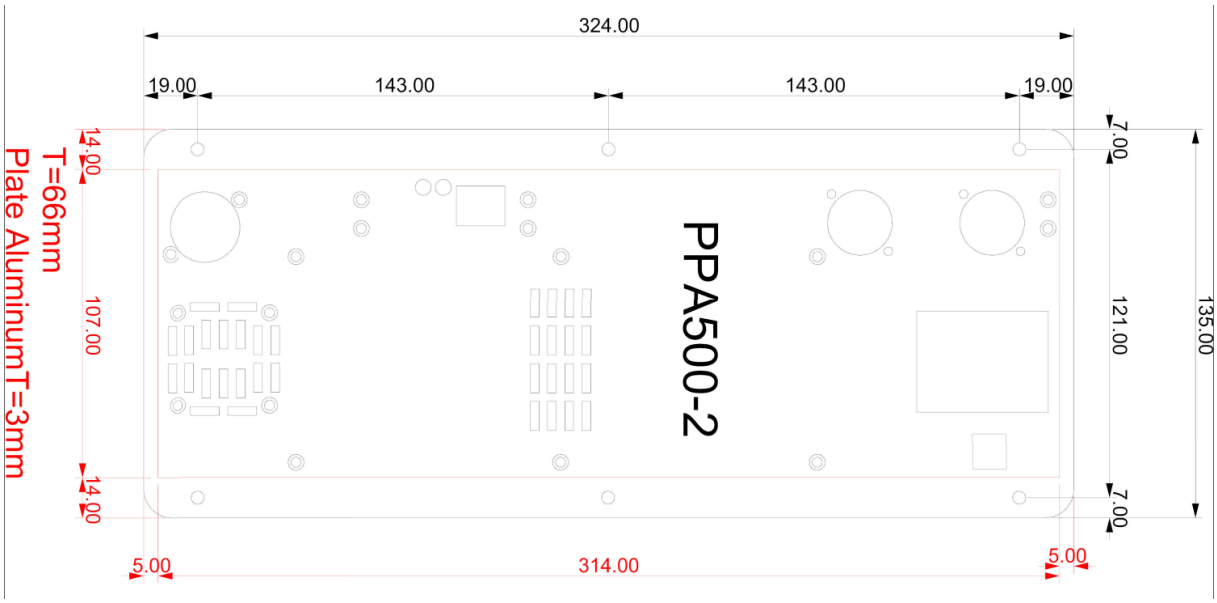
9.5. PPA 1600-2 PC-IEC



9.6. PPA 1600-4 PC-IEC



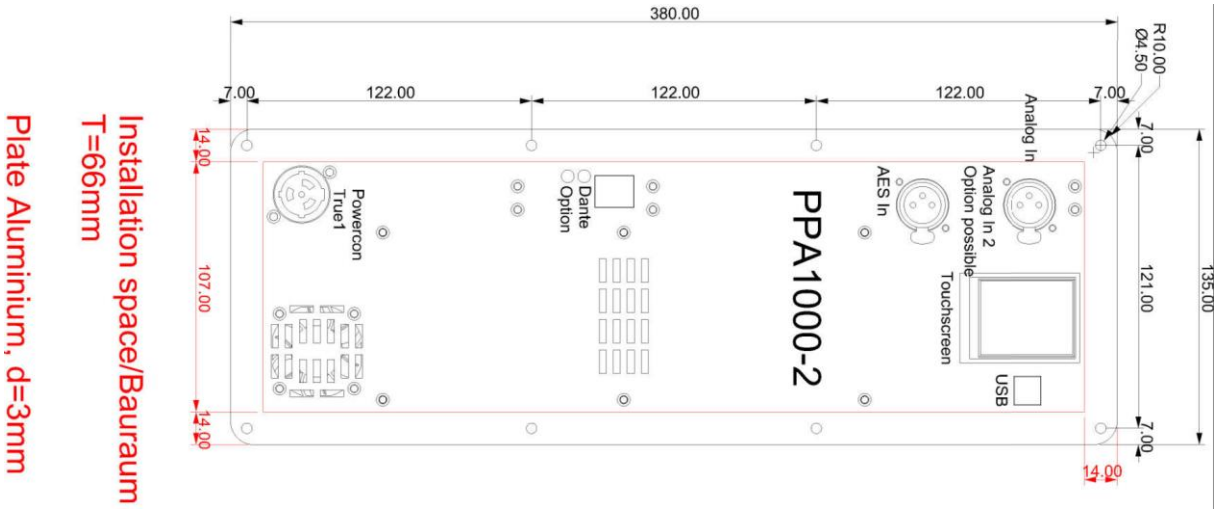
9.7. PPA 500-2 AC



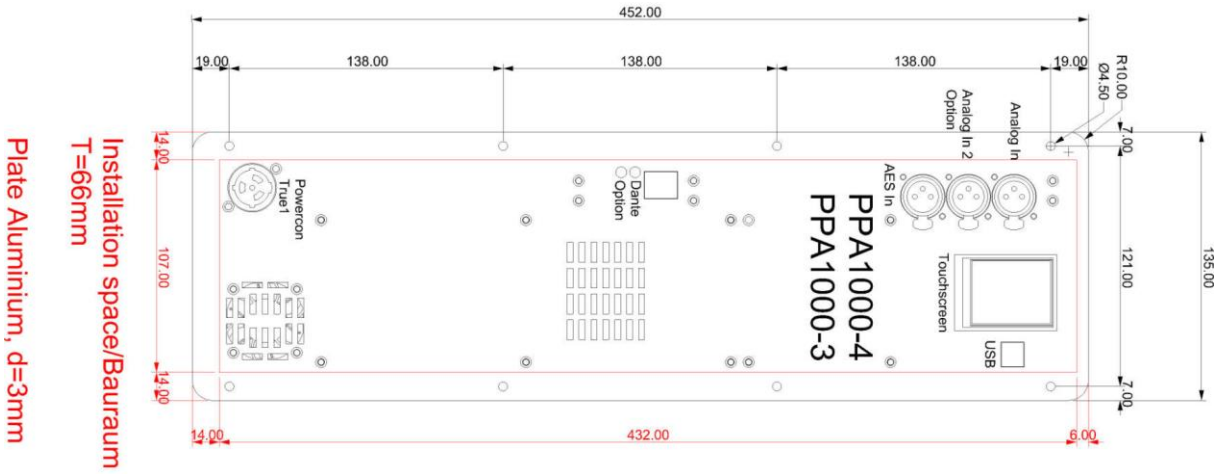
9.8. PPA 500-3/-4 AC

t.b.d

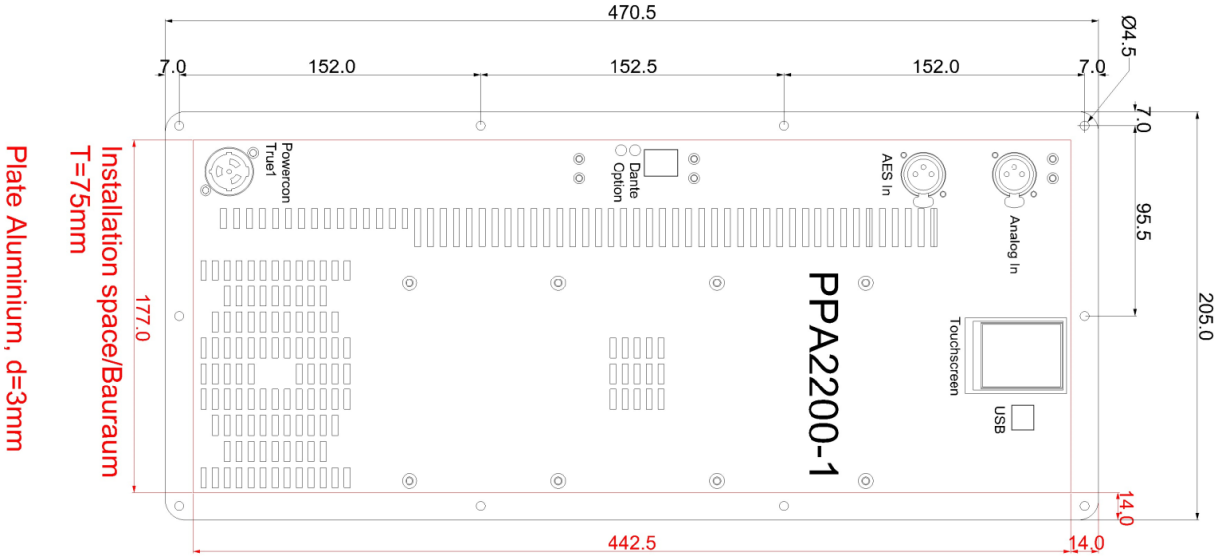
9.9. PPA 1000-2 AC



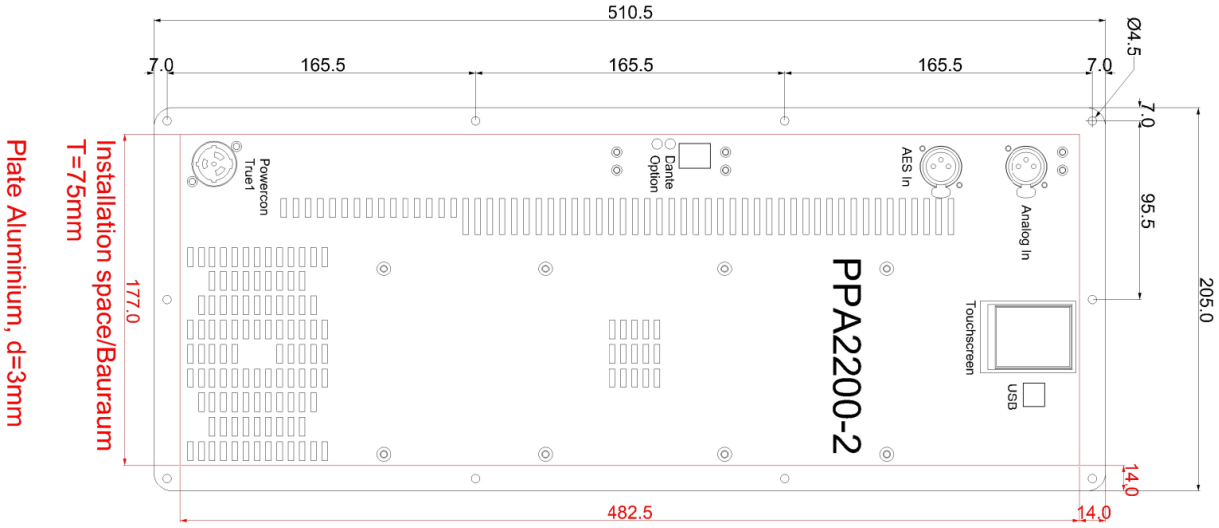
9.10. PPA 1000-3/-4 AC



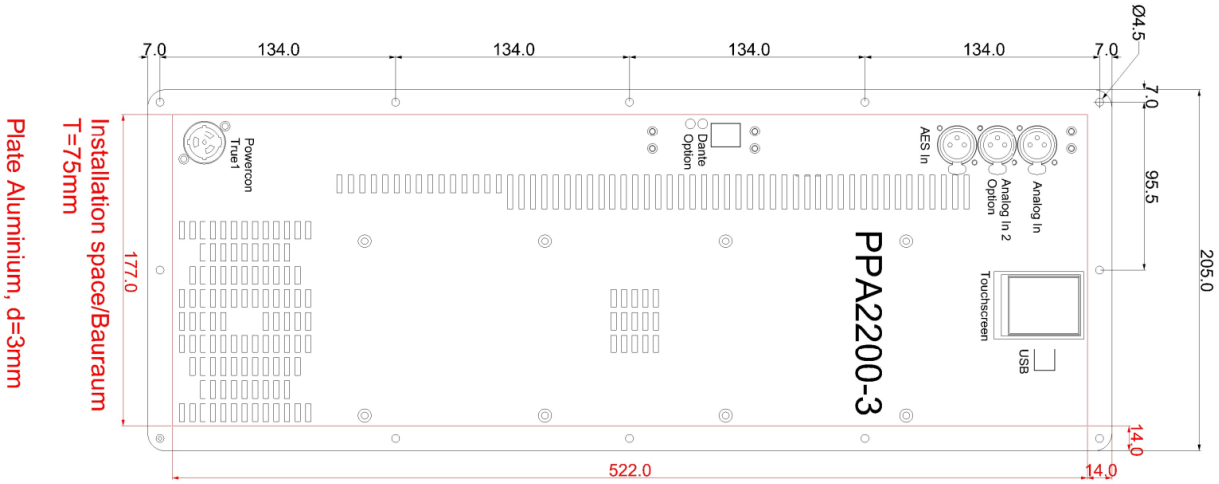
9.11. PPA 2200-1 AC



9.12. PPA 2200-2 AC



9.13. PPA 2200-3 AC



10. Contact

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11. Document Revision History

Date	item	Version	By
2021-07-04	Included 1600-2/-4, removed software description -> separate manual added drawings	2.0	RTh
2017-06-27	Preliminary release with software guidelines.	1.9	RTh
2017-06-09	Major update of all technical information to HW Rev. 2.1, Added complete PPA product range	1.8	StM
2017-04-27	Added BTL for X-PRO3	1.0.1	StM
2016-07-06	first official version. Update FW Update screenshots. Measurements revised	1.0	StM
2016-06-30	Initial draft (some parameters missing)	0.1	StM

The manufacturer reserves the right to make technical changes and modifications within the framework of legal norms as well as improving the performance characteristics of the product at any time.