

## ▼ SWITCH MODE POWER SUPPLIES

### ▼ PS500

#### ► DATASHEET

## Introduction

The PS500 is a high efficiency Safety Class 2 switch mode power supply specifically designed to be used in combination with single or dual Nilai500 modules. Key features are high efficiency over the entire load range, use of audiophile components and interleaved PFC for increased power density and lower conducted EMI.

The PS500 features a comprehensive overcurrent protection. When an overload condition remains for a longer period of time, the supply voltage gradually decreases until entering hiccup mode.

Universal mains capability ensures reliable operation across the globe. Sturdy Molex® connectors provide a solid connection to the amplifier modules while the user has control over on/off operation through the I/O and HBUS connectors.

The user accessible 5V standby and symmetrical auxiliary supply enables the user to connect third party electronics which makes the PS500 ideal for DIY purposes.

## Key Features

- High End Audio Amplification
- Interleaved PFC Stages
- Supplies Single Or Dual Nilai500 Amplifiers
- Universal Mains Input
- 2013 ErP Lot 6 0.5W Standby Supply

## Key Specifications

Output Power	600W
Short Term Output Power	800W
Output Voltage	±70V
Standby Supply	5V/1A
Auxiliary Supply	±18V/200mA
Standby Power	0,2W
Idle Power	5,5W

# Contents

<b>1. Safety Precautions</b>	<b>.3</b>
<b>2. Electrical Specifications</b>	<b>.4</b>
2.1 Power Specifications	.4
2.2 Standby Power Supply.	.4
2.3 Main Power Supply	.4
<b>3. IO Specifications.</b>	<b>.5</b>
3.1 J2 - HBUS	.5
3.1.1 Auxiliary Supply	.5
3.1.2 Standby Supply	.5
3.1.3 Amp Fatal Error	.5
3.1.4 Power Good.	.5
3.1.5 Power Supply Enable	.5
3.1.6 Mains Voltage Detection	.5
3.2 J5 - User IO.	.5
3.2.1 LED ON	.5
3.2.2 LED Standby	.5
3.2.3 Push Button (ON/OFF control)	.5
3.2.4 Trigger Input (ON/OFF control).	.5
3.2.5 Toggle Switch Input (ON/OFF control)	.5
<b>4. Connector Pinouts</b>	<b>.6</b>
4.1 J1 - AC Connector	.6
4.2 J2 - HBUS (extended)	.6
4.3 J3 / J4 Amplifier Connector	.7
4.4 J5 - User IO Connector.	.7
<b>5. Dimensions &amp; Drill Pattern</b>	<b>.8</b>
5.1 Dimensions	.8
5.2 Drill Pattern	.9
<b>6. Revisions</b>	<b>10</b>
<b>7. Disclaimer</b>	<b>10</b>

## 1 Safety Precautions



This module operates at mains voltage and carries hazardous voltages at accessible parts. These parts may never be exposed to inadvertent touch. Observe extreme care during installation and never touch any part of the unit while it is connected to the mains.

Disconnect the unit from the mains and allow all capacitors to discharge for 10 minutes before handling it.



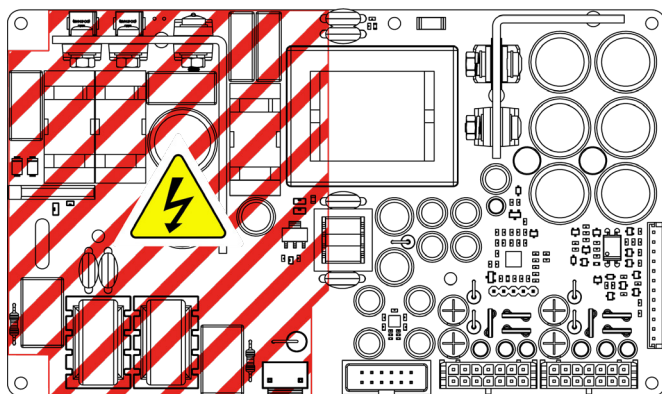
Attention: Observe precautions for handling electrostatic sensitive devices. This module uses semiconductors that can be damaged by electrostatic discharge (ESD).

Damage due to inappropriate handling is not covered by warranty.  
This product has no user-serviceable parts.



This symbol indicates the presence of hazardous voltages at accessible conductive terminals on the board. Parts that are not highlighted in red may also carry voltages in excess of 420 Vdc!

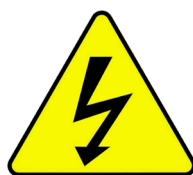
Warning: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.



This is a Safety Class 2 device. When mounting the module in an enclosure, a minimum safety distance of 6mm from the SMPS to all possible conducting parts must be ensured to keep compliance with Safety Class 2. All parts enclosed by the red hatched area carry hazardous voltages. This includes parts on the top and the bottom of the board.

When the PS500 is mounted in a tight space there needs to be at least 6mm clearance or a layer of insulation with a minimum thickness of 0.5mm between the top of the transformer and the housing. Only use insulated spacers in the red hatched area. The fourth hole should be a conductive spacer to improve EMI performance.

## Précautions de sécurité



Ce module est sous tension secteur et certaines de ses pièces accessibles sont sous une tension dangereuse. Ces pièces doivent dans tous les cas être protégées contre contacts accidentels. Lors de l'installation, une prudence extrême s'impose. Ne jamais toucher les pièces du module quand celui-ci est relié au secteur.

Isoler l'appareil du secteur et attendre 10 minutes pour laisser à tous les condensateurs le temps de se décharger avant de le manipuler.



Attention : Respecter les consignes de sécurité pour la manipulation d'appareils sensibles aux courants électrostatiques. Ce module est pourvu de semiconducteurs qui peuvent être endommagés par les décharges électrostatiques (DES).

Les dommages causés par un usage non approprié sont exclus de la garantie.  
Ce produit ne contient aucune pièce devant être entretenue par l'utilisateur.



Ce symbole indique la présence de tensions dangereuses aux broches de raccordement accessibles sur la carte. Les pièces non marquées en rouge peuvent être elles aussi sous une tension supérieure à 420 VCC.

Avertissement: Pour réduire les risques de choc électrique, ne pas exposer cet appareil à la pluie ou l'humidité.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the application.
7. Only use attachments/accessories specified or approved by the manufacturer.
8. Unplug this apparatus during lightning storms or when unused for long periods of time.
9. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally or has been dropped.
10. Don't run any cables across the top or the bottom of the module. Apply fixtures to cables to ensure that this is not compromised.
11. Observe a minimum clearance of 6mm with all possible conducting parts (housing etc.).
12. Natural convection should not be impeded by covering the module (apart from the end applications housing).
13. This product is to be used with Hypex amplifier modules only.
14. Before using this product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, do not use the product.
15. Changes or modifications not expressly approved by Hypex Electronics will void compliance and therefore the user's authority to operate the equipment.
16. Service or modifications by any person or persons other than by Hypex Electronics authorized personnel voids the warranty.

## 2 Electrical Specifications

### 2.1 Power Specifications

Parameter	Remarks	Symbol	Min	Typ	Max	Unit	Note
Line Input Voltage		$V_B$	100 - 240 +/- 10%			Vac	
Line Input Frequency		$f$	47		63	Hz	
Fuse Rating	250VAC, slow blow			6.3		A	1)

**Note 1:** Fuse is soldered on the PCB and is therefore not user replaceable.

### 2.2 Standby Power Supply

The standby power supply is immediately active upon connection to the mains and can therefore be used to power external control circuitry and to operate the PS Enable pin.

Parameter	Remarks	Symbol	Min	Typ	Max	Unit	Note
Output Voltage	-	$V_{OUT}$	4,9	5	5,1	Vdc	
Output Current	Continuous	$I_{OUT,MAX}$	-	-	1	Adc	1)
Output Current	For ERP compliance	$I_{OUT,ERP}$	-	-	25	mA	
External Capacitance	-	-	-	-	4700	$\mu F$	
Switching Frequency	-	$f_{SW,STB}$	-	-	130	kHz	
Efficiency	Full power	$\eta$	-	71	-	%	
Standby Power	No load	$P_{STB}$	-	-	0,2	W	
Output Voltage Ripple	Full power	$V_{RIPPLE}$	-	-	0,1	V	

**Note 1:** Protected against shorting and overloading, auto recover when overcurrent condition is removed.

### 2.3 Main Power Supply

Parameter	Remarks	Symbol	Min	Typ	Max	Unit	Note
Output Voltage	Main supply	$V_{OUT}$	69	70	71	Vdc	
Output Short Circuit Current	Rail to rail	$I_{OUT}$	-	6	-	Adc	1)
Output Power	Resistive load	$P_R$	-	-	600	W	
Max Output Power	Resistive load, 50ms	$P_{R,MAX}$	-	-	800	W	
Output Power Cont.	Resistive load	$P_{R,CONT}$			100	W	
Efficiency	600W @ 230V/50Hz	$\eta$	-	92	-	%	
Idle Losses	230V/50Hz	$P_0$	-	5,5	-	W	
Inrush Current	Worst case	$I_{INRUSH}$	-	-	65	A	
Power Factor	600W @ 120V/60Hz	PF	-	99	-	-	
Power Consumption	600W @ 120V/50Hz	$P_{MAX}$	-	-	650	W	
Output Voltage Vaux	HBUS, Regulated	$V_{AUX}$	$\pm 17.9$	$\pm 18$	$\pm 18.1$	Vdc	
Output Current Vaux	HBUS, Regulated	$I_{AUX}$	-	-	$\pm 150m$	Adc	1)
Output Voltage Vsig	J3, J4	$V_{SIG}$	$\pm 22,2$	$\pm 23,5$	$\pm 23,8$	Vdc	
Output Current Vsig	J3, J4	$I_{SIG}$	-	-	$\pm 200m$	Adc	1)
Output Voltage Vdr	J3, J4	$V_{DR}$	22,7	23,0	23,3	Vdc	
Output Current Vdr	J3, J4	$I_{DR}$	-	-	200m	Adc	1)

**Note 1:** Protected against shorting and overloading, auto recover when overcurrent condition is removed.

## 3 IO Specifications

### 3.1 J2 - HBUS

The HBUS offers extra features for use with third party electronics e.g. an input buffer board, DAC etc. For most use cases this connector can be omitted entirely. For a standard use case connector **J5** will suffice.

#### 3.1.1 Auxiliary Supply

Positive and negative 18V auxiliary supply for use in user application. Available only when main supply is enabled.

#### 3.1.2 Standby Supply

5V standby voltage for use in user application. Available right after unit is powered. No action required from customer.

#### 3.1.3 Amp Fatal Error

Open collector output (Max 50V/10mA). Output is pulled down in case of a catastrophic amplifier failure. Status can only be reset by disconnecting the unit from the mains for at least 10 minutes.

#### 3.1.4 Power Good

Open collector output (Max 50V/10mA). Output is pulled down when all voltages lie within specifications and the unit is ready for operation.

#### 3.1.5 Power Supply Enable

Apply 5V (preferably from standby supply) to switch on the PS500. This function is identical to the one offered on connector J5.

#### 3.1.6 Mains Voltage Detection

Open collector output (Max 50V/10mA). Output is instantly pulled low when the unit is disconnected from mains.

### 3.2 J5 - User IO

Use of this connector is required to be able to switch the PS500 ON and OFF. Pick any of the three options explained below (Using multiple options is possible, however the PS500 can only be switched OFF with the option it was initially switched ON with). LED's can be added to indicate ON/OFF and/or STANDBY.

#### 3.2.1 LED ON

Connect an LED to indicate that the PS500 is powered ON (LED current is limited by PS500).

#### 3.2.2 LED Standby

Connect an LED to indicate that the PS500 is in STANDBY mode (LED current is limited by PS500).

#### 3.2.3 Push Button (ON/OFF control)

Connect a momentary switch to switch the PS500 ON and OFF.

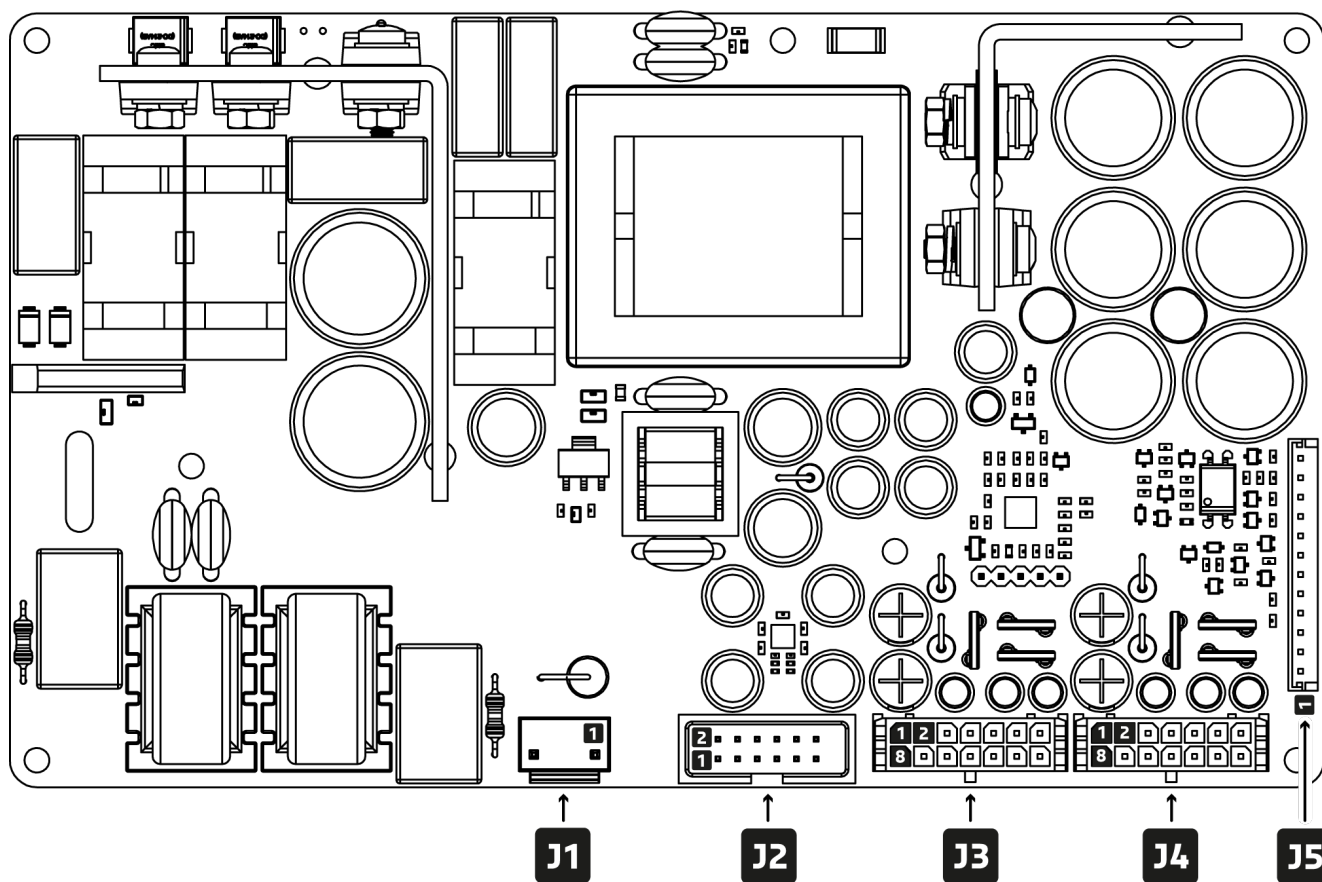
#### 3.2.4 Trigger Input (ON/OFF control)

Connect the trigger output from a master device (usually 12VDC) to switch the PS500 ON and OFF. PS500 accepts voltages from 4V-18V. Polarity is unimportant.

#### 3.2.5 Toggle Switch Input (ON/OFF control)

Connect a toggle switch to switch the PS500 ON and OFF (connect switch between this pin and +5V standby).

## 4 Connector Pinouts



### 4.1 J1 - AC Connector

Pin	Direction	Function	Remarks
1	Input	Mains input	Line
2	Input	Mains input	Neutral

### 4.2 J2 - HBUS (extended)

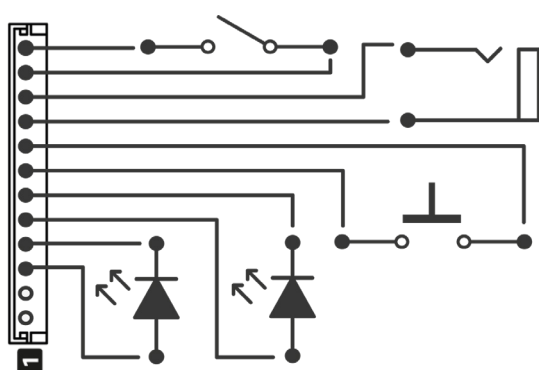
Pin	Direction	Function	Remarks
1	Output	+18V auxilliary	Positive auxilliary supply
2	Output	-18V auxilliary	Negative auxilliary supply
3	Output	+5V standby	Standby supply
4	-	GND	Ground
5	-	NC	
6	-	NC	
7	Output	Amp fatal error	Indicates fatal amplifier error
8	Output	Power good	Indicates correct supply startup
9	Input	Power supply enable	Enables main power supply
10	Output	Mains voltage detection	Indicates mains voltage present
11	-	GND	Ground
12	-	NC	

### 4.3 J3 / J4 Amplifier Connector

Pin	Direction	Function	Remarks
1	Output	+VB	Amplifier main positive power supply
2	Output	+VB	Amplifier main positive power supply
3	-	GND	Amplifier ground
4	-	GND	Amplifier ground
5	Input	Amp fatal	Indicates fatal amplifier error
6	Output	+VSIG	Opamp positive power supply
7	Output	Amplifier enable	Enables amplifier
8	Output	-VB	Amplifier main negative power supply
9	Output	-VB	Amplifier main negative power supply
10	-	GND	Amplifier ground
11	-	GND	Amplifier ground
12	Output	Vdr	Amplifier driver voltage
13	Output	-VSIG	Opamp negative power supply
14	-	GND	Amplifier ground

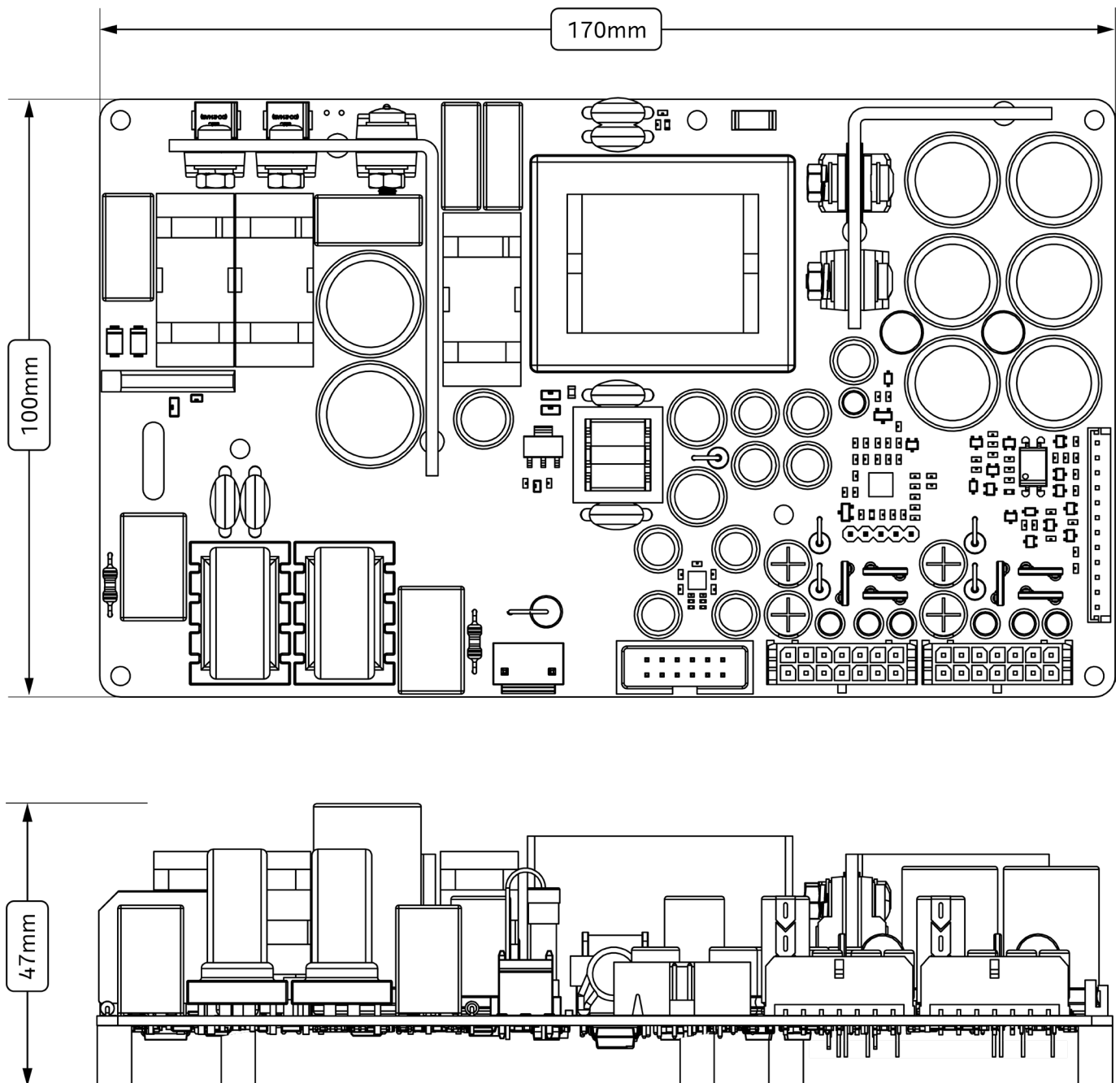
### 4.4 J5 - User IO Connector

Pin	Direction	Function	Remarks
1	Output	+5V standby	Standby supply
2	-	GND	Ground
3	Output	LED On+	Indicates power supply on (LED Anode)
4	Output	LED On-	Indicates power supply on (LED Cathode)
5	Output	LED standby+	Indicates power supply standby (LED Anode)
6	Output	LED standby-	Indicates power supply standby (LED Cathode)
7	Input	Pushbutton+	Connection for momentary switch
8	Input	Pushbutton-	Connection for momentary switch
9	Input	Trigger+/-	Connection for external trigger
10	Input	Trigger+/-	Connection for external trigger
11	Input	Switch	Connection for toggle switch
12	Output	+5V standby	Standby supply



## 5 Dimensions & Drill Pattern

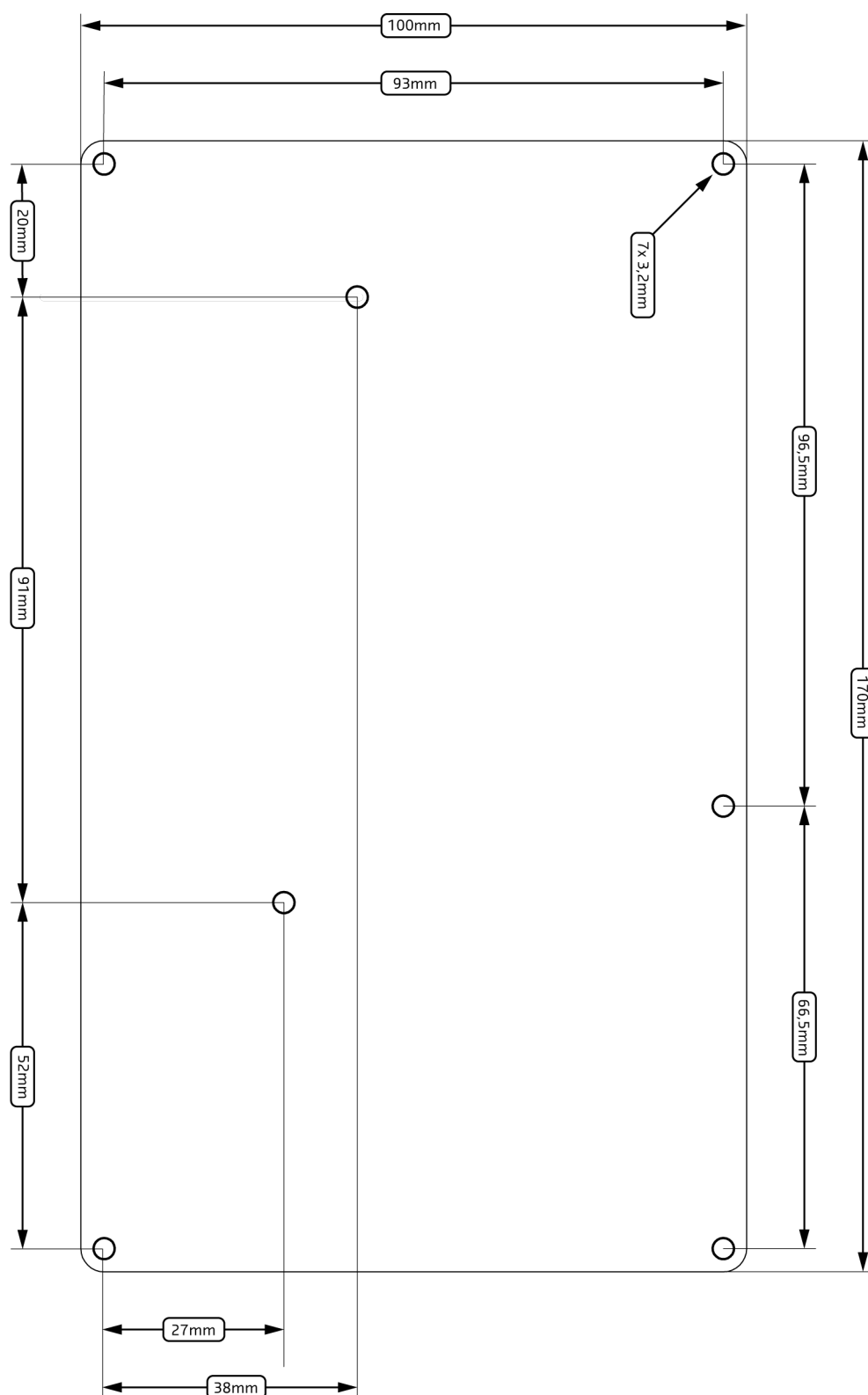
### 5.1 Dimensions





## 5.2 Drill Pattern

(Top view)



This image is actual size and can be used as a drilling template if printed out correctly.

## 6 Revisions

Document Revision	Module Revision	Change Log	Date
R1	PS500 01xx	First revision	31.10.2022
R2	PS500 01xx	Typo's corrected	07.11.2022
R3	PS500 01xx	Trigger minimum input voltage increased Mains detection function corrected	07.07.2023

## 7 Disclaimer

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

Hypex Electronics BV, its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Hypex Electronics"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

This subassembly is designed for use in music reproduction equipment only. No representations are made as to fitness for other uses. Except where noted otherwise any specifications given pertain to this subassembly only. Responsibility for verifying the performance, safety, reliability and compliance with legal standards of end products using this subassembly falls to the manufacturer of said end product.

**LIFE SUPPORT POLICY:** Use of Hypex products in life support equipment or equipment whose failure can reasonably be expected to result in injury or death is not permitted except by explicit written consent from Hypex Electronics BV.