



QUALITY  
SUPPORT  
RELIABILITY

# COBRA-S1 / S2 DATA SHEET

High End switching power supply for audio applications

## Features

Sheet : 200052022  
Revision 4.0

- 120VAC ~ 250VAC Input (Active PFC)
- Standby input
- Plug & Play with Purifi amplifiers
- DC Error input
- Amp enable output
- Onboard standby power supply
- 26CM \* 12.4CM \* 6CM
- 2X DC outputs
- 2X AUX outputs
- 0.1W Power consumption in standby mode



## Typical applications

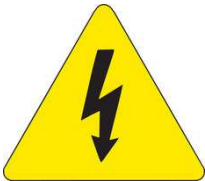
- \* Professional audio systems
- \* Consumer audio products
- \* HiFi audio systems

## Highlights

- \* High reliability
- \* High efficiency
- \* Low EMI signature
- \* Power factor corrector

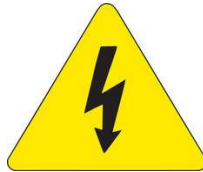


## Safety Warning



The **COBRA-S1** operates at mains voltage and carries hazardous voltages up to **420VDC** 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 **15 minutes** before handling it.



**IMPROPER HANDLING MAY RESULT IN PERSONAL INJURY**



**Ignoring the safety warning may lead to a nasty surprise on later stage!**

## COBRA-S1 will not tolerate with any mistake

### How may a nasty surprise occur?

1- Connecting the SMPS to the AC line in the wrong way, like swapping (LIVE with GROUND) for example.



2- Swapping the polarity at the connected equipment, either from the MAIN output or the AUX outputs.

3- Shorting any pin from the SMPS inputs / outputs to your chassis somehow.

4- Touching any part of the SMPS while the SMPS is connected to your AC line or even in standby mode, or before discharging the onboard capacitors.

5- Connecting the power supply to your amplifier while the power supply is still charged.

6- Conducting tests on the SMPS / AMPLIFIER while its ON & connected to your amplifier or vice versa by probing some test points.

7- Moving the entire setup from location to another while its NOT mounted properly on the chassis while they are powered ON or when the SMPS is not fully discharged.

8- Trying to build or complete your setup while you are TIRED!



**Again, its only **one mistake needed** to destroy your entire setup in no time if you don't check and verify every step while you are working.**

COBRA-S2 can easily deliver up to 21A at 240VAC operation, and that current is more than enough to destroy your entire setup in addition to a cloud of smoke if anything goes wrong!

Usually, installation is very smooth if followed by inspecting each step.





## Introduction

The COBRA-S1 is an **unregulated** high efficiency switch mode power supply specifically designed for audio applications, where high system reliability is a required feature.

The COBRA-S1 is a SMPS with power factor corrector front end, excellent PFC regulation guarantees low voltage drop at the output across the entire load curve.

COBRA-S1 also features an advanced over current protection & thermal protection, AC-Line loss detection to immediately stop the SMPS once disconnected from the AC-LINE.

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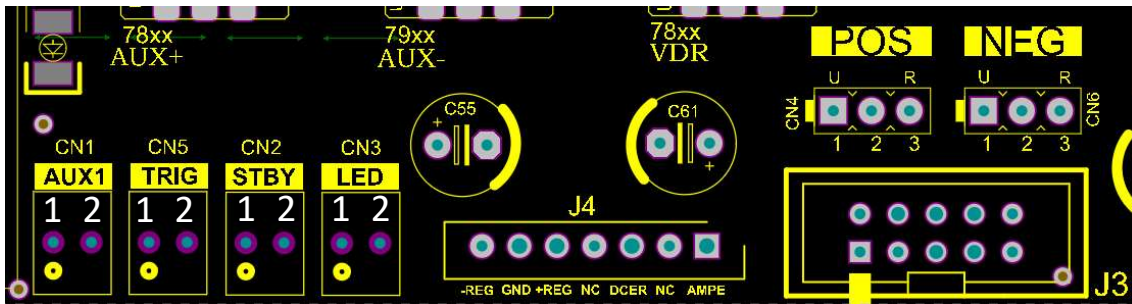
## Detailed description of specifications

- Power factor corrector.
- Unregulated SMPS.
- Wide input voltage range (110 VAC ~ 250 VAC).
- Multiple output voltage range (+-40 VDC ~ +-85 VDC). Single or dual.
- 0.1W Power consumption in standby mode
- NOTE-1 (-SS Model is the single rail output)
- Standby switch input eliminates the need for mechanical switches.
- Onboard standby power supply (+5V /+12VD 200mA) 3W MAX.
- Amplifier enable output (OPTO Isolated).
- DC Error input.
- AUX regulated outputs +-5 VDC ~ +-24 VDC.
- IDC connector can select regulated or unregulated AUX voltage via jumpers.
- Bootstrap VDR supply output +12VDC ~ +18VDC (Completely isolated output) should be tied to -HV in class-d amplifier applications.
- AC-Line loss detection
- LED output for front panel indicator

### NOTE-1 :

Output voltage is set by transformer selection; a list of available voltages are mentioned later.

## Connector Pinout 1/3



### (CN1) 12V (Standby power supply output AUX1)

| Connector                                                                  | Pin number | Type   | Function | Notes         |
|----------------------------------------------------------------------------|------------|--------|----------|---------------|
| AUX1                                                                       | 2          | Output | +12VDC   | Positive rail |
| AUX1                                                                       | 1          | GND    | GND      | GND rail      |
| The output voltage for this output can be 5VDC or 12VDC based on selection |            |        |          |               |

### (CN2) Standby Input (STBY)

| Connector | Pin number | Type  | Function | Notes                 |
|-----------|------------|-------|----------|-----------------------|
| Standby   | 2          | Input | Standby  | Standby input trigger |
| Standby   | 1          | GND   | GND      | GND                   |

### (CN3) LED output

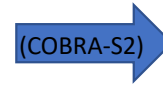
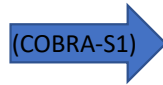
| Connector | Pin number | Type   | Function | Notes           |
|-----------|------------|--------|----------|-----------------|
| LED       | 2          | Output | +        | Positive of LED |
| LED       | 1          | -      | -        | Negative of LED |

### (CN5) Trigger input (9V ~ 12V)

| Connector | Pin number | Type  | Function | Notes                     |
|-----------|------------|-------|----------|---------------------------|
| Trigger   | 2          | Input | +        | Trigger input from +12V   |
| Trigger   | 1          | GND   | GND      | GND (Of the +12V trigger) |

## Connector J4 & J5

### 3.3 Aux connector, J4



| Pin | Signal        | Rating | I/O    | Description                                                                                  |
|-----|---------------|--------|--------|----------------------------------------------------------------------------------------------|
| 1   | PSUDIS /AMPON |        | O<br>I | PSU off control signal (SW Mode), or<br>Amplifier Disable (HW Mode) – pull low to enable Amp |
| 2   | SDA<br>READY  |        | I<br>O | I2C Data (SW Mode), or<br>Amplifier Ready (HW Mode) – “all good for operation” when high     |
| 3   | SCL<br>/FATAL |        | I<br>O | I2C clock (SW Mode), or<br>Amplifier “error/fail” (HW Mode) – signal goes low on error       |
| 4   | +5V           |        | P      | 5V output (from onboard regulator), 20mA max load. Requires R1 mounted                       |
| 5   | +VUNREG       |        | P      | Voltage regulator input, positive rail                                                       |
| 6   | GND           |        | P      | Ground                                                                                       |
| 7   | -VUNREG       |        | P      | Voltage regulator input, negative rail                                                       |

➡ Connectors J4 & J5 are connected in parallel (COBRA-S2), and they are pin to pin compatible with the Purifi EVAL1 & EVAL2 amplifiers. And using the same type of connectors.

➡ You must check and verify your connections and setup before you connect this connector to your amplifier.

➡ Pin 1 location is shown on the SMPS PCB, its just a straightforward connection without any complications.

➡ Connectors J4 & J5 Supports **REGULATED** output voltage ONLY, and they don't provide **UNREGULATED** voltage.

If you need **UNREGULATED** voltage, you must get it from J3 and set CN4 & CN6 as needed to get **REGULATED** or **UNREGULATED** voltage.

➡ **Splitter PCBs are available for splitting purposes, for J3,J4,J5.**

➡ **High quality cables are available for J3,J4,J5 in multiple lengths.**

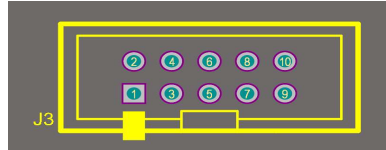
## The trigger input ( CN5 )

Feed this input with any voltage between 9VDC to 12VDC to turn ON / OFF the SMPS from an external source like AV receivers.

Either input will control the SMPS ON / OFF function. The standby input switch or the external trigger. Priority is for the first trigger signal.

This input will not affect your AV receiver or the SMPS as it will not give voltage to your device or the SMPS.

## Connector Pinouts 2/3



| Connector J3 |            |        |                 |                                       |
|--------------|------------|--------|-----------------|---------------------------------------|
| Connector    | Pin number | Type   | Function        | Notes                                 |
| J3           | 1          | Output | Positive Output | Select able Output (VAUX / UNREG,REG) |
| J3           | 2          | Output | Negative Output | Délectable Output (VAUX / UNREG,REG)  |
| J3           | 3          | GND    | GND             | Ground                                |
| J3           | 4          | NC     | NC              | Do not connect                        |
| J3           | 5          | Output | Emitter         | Amplifier enable (Opto isolated) E    |
| J3           | 6          | Output | Collector       | Amplifier enable (Opto isolated) C    |
| J3           | 7          | NC     | NC              | Do not connect                        |
| J3           | 8          | NC     | NC              | Do not connect                        |
| J3           | 9          | GND    | GND             | Ground                                |
| J3           | 10         | Input  | DC-Error        | DC-Error trigger input                |

### Jumpers JP1 & JP2 description

Jumper Setting (VAUX Regulated or Unregulated)

JP1 (Negative rail **Pin2 J3.2**) and JP2 (Positive rail on **Pin1 J3.1**) are used to select the output voltage on pin J3.1 and J3.2, two options are possible

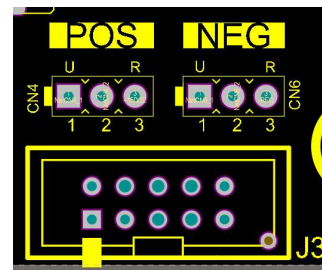
- Position 1-2: Unregulated VAUX
- Position 2-3: Regulated VAUX

### Unregulated situation

For example, shorting pin1 with pin2 on **JP1** will give you **-25VDC** on **Pin2 of J3**  
 For example, shorting pin1 with pin2 on **JP2** will give you **+25VDC** on **Pin1 of J3**

### Regulated situation

For example, shorting pin2 with pin3 on **JP1** will give you **-15VDC** on **Pin2 of J3**  
 For example, shorting pin2 with pin3 on **JP2** will give you **+15VDC** on **Pin1 of J3**

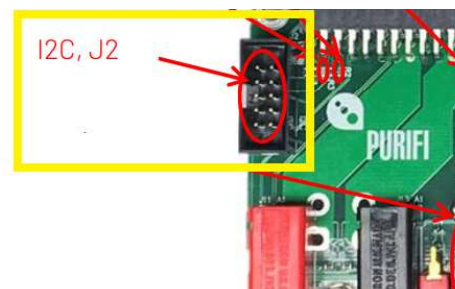


As shown in the picture, JP1 is marked as NEG = Negative rail  
 And JP2 is marked as POS = Positive rail

→ Please check with your multimeter the final voltage before connecting your circuit.

→ **WARNING:** This connector CANNOT be used with the PURIFI amplifier (I2C, J2), and it is not compatible with that connector, the connector is marked in the PURIFI as (I2C, J2),

→ **This is not a plug and play connector for Purifi amplifier.**



### General Performance Data

| Parameter                   | Symbol          | Min  | Typ | Max  | Unit            | Note-1             | Note-2              |
|-----------------------------|-----------------|------|-----|------|-----------------|--------------------|---------------------|
| Input voltage               | VAC_range_lo    | 100  | *   | 250  | V <sub>Ac</sub> |                    |                     |
| Input frequency             |                 | 47   | 50  | 63   | Hz              |                    |                     |
| Switching frequency         | F_sw            | *    | 65  | *    | KHz             |                    |                     |
| Output voltage main         | V_main output   | 40   |     | 84   | V <sub>Dc</sub> | Unregulated        | Based on order      |
| Output current (Continuous) | I_main output   | *    | 8   | 9    | A <sub>Dc</sub> |                    |                     |
| Output current (Peak)       | IPK_main output | *    | *   | 13   | A <sub>Dc</sub> | 15A Limit @ 240VAC | 10A Limit @ 100V AC |
| Output power main           | Pout            | *    | *   | 1000 | W               |                    |                     |
| Over current triggers @     | OCP_trigger     | *    | 14  | 16   | A <sub>Dc</sub> |                    |                     |
| Thermal trigger             | TH_trigger      | *    | 70  | 75   | C               |                    |                     |
| Output voltage (12V)        | VAux1_reg       | 12   | 12  | 12   | V <sub>Dc</sub> | Regulated          |                     |
| AUX_1 output current        | I_Aux1          | *    | 200 | 220  | mA              |                    |                     |
| Output voltage (+-15V)      | VAux3_reg       | 5    | *   | 18   | V <sub>Dc</sub> | Regulated          | Based on order      |
| AUX_2 output current        | I_Aux3          | *    | 100 | 200  | mA              |                    |                     |
| Output voltage (VDR)        | VDR_reg         | 12   | *   | 18   | V <sub>Dc</sub> | Regulated          | Based on order      |
| VDR output current          | I_VDR           |      | 100 | 220  | mA              |                    |                     |
| In-rush current             | 5R NTC          |      |     | 35   | A               | TBD                |                     |
| Efficiency                  | Full power      | 87   | 90  | 91   | %               |                    |                     |
| Idle Losses                 | SMPS not loaded | *    | *   | *    | W               |                    | SMPS is ON          |
| Stand-by loss               |                 | 0.09 | 0.1 | 0.15 | W               |                    | SMPS in Stand By    |



### Connector pinout detailed description and operation

#### **The 12V output**

Those outputs are coming directly from the standby power supply, and they reflect what voltage they provide.

The standby power supply will remain ON as long as the COBRA-S1 is connected to your power line, switching the main SMPS on /off will NOT affect the standby power supply operation at all.

The 12V output can be used for the FAN. Polarity of each pin is marked on the PCB.

#### **The AUX output J4 & J5**

This output is the auxiliary regulated output of the SMPS, and its output voltage is determined by the installed voltage regulators. And can be anywhere from +-12VDC up to +-24VDC.

This output is protected from over current and short circuits. This connector also has the DC error input and the AMP ENABLE output.

#### **The Standby input**

This connector is where you will connect the switch that controls the SMPS on/off operation, shorting this connector will put the SMPS into **RUN MODE** opening this connector pins will put the SMPS into **STANDBY** mode. Latching switch is needed.

A latching switch is a switch that maintains its state after being activated.

A push-to-make, push-to-break

(SEE NEXT PAGE ON HOW TO WIRE THE SWITCH WITH LED)

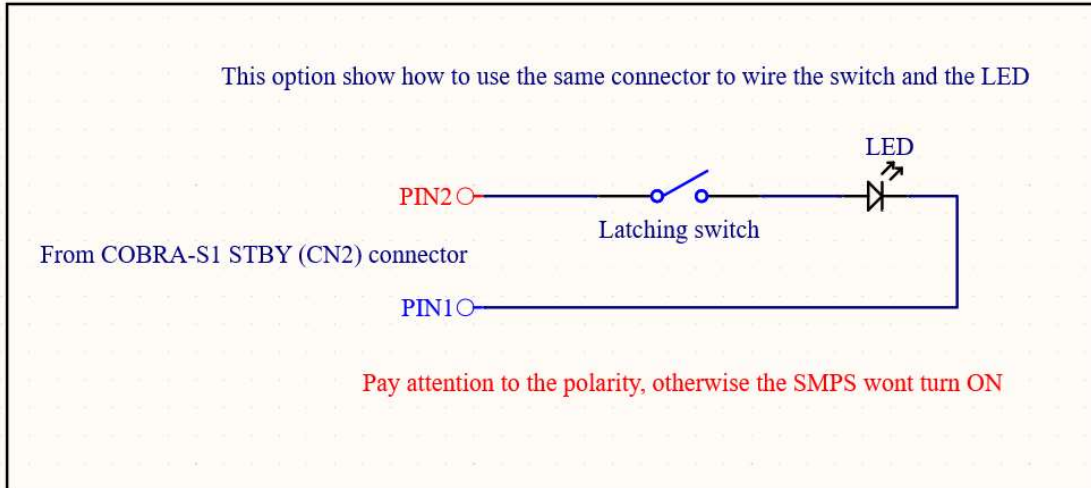
Example:- <http://www.ulincos.com/product.php?id=55>

#### **The DC-Error input in J4 & J5**

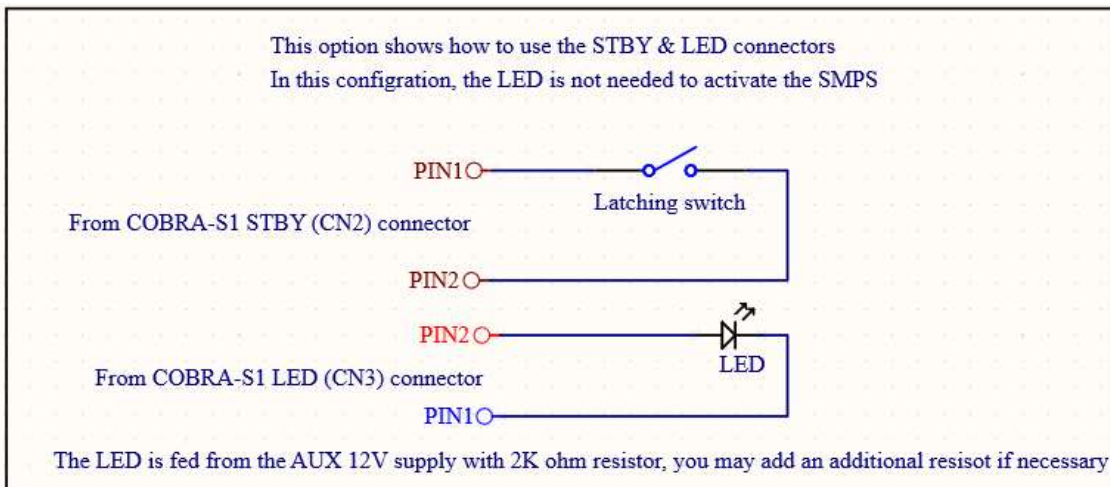
In the event of a critical failure occurring in the connected amplifier, the COBRA-S1 needs to be switched off immediately. Once this input is triggered the SMPS will enter **PROTECT** mode and will not auto-recover. To reset the DC Error the COBRA-S1 must be disconnected from mains for at least 5 minutes to allow the primary capacitors to drain. Shorting the pins of this input will put the COBRA-S1 into **PROTECT** mode.

Below is the wiring for the standby switch

OPTION-1

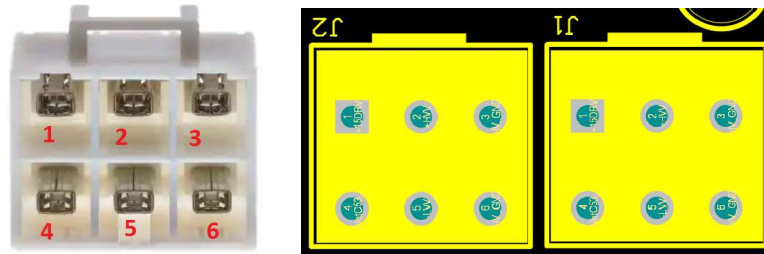


OPTION-2



### Connector Pinouts 3/3

Connector (J1& J2)



### J1 & J2 - Main output connector

| J1 & J2   |            |        |          |                                   |
|-----------|------------|--------|----------|-----------------------------------|
| Connector | Pin number | Type   | Function | Notes                             |
| J2.1      | 1          | Output | VDR+     | Positive bootstrap driver voltage |
| J2.2      | 2          | Output | HV+      | Positive supply rail              |
| J2.3      | 3          | GND    | GND      | Ground                            |
| J2.4      | 4          | Output | VDR-     | Negative bootstrap driver voltage |
| J2.5      | 5          | Output | HV-      | Negative supply rail              |
| J2.5      | 6          | GND    | GND      | Ground                            |

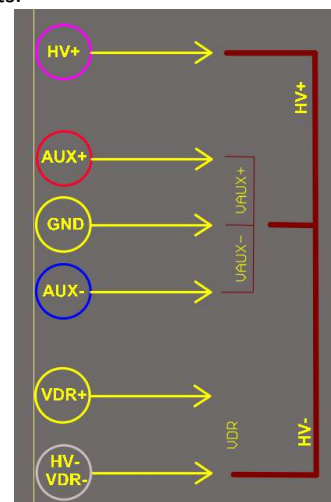
#### Bootstrap Driver Voltage (VDR)

The COBRA-S1 provides a regulated Bootstrap Driver Voltage (VDR) which is used to power the driver circuit of any Class-D amplifier. Most amplifier modules need the VDR voltage referenced to the negative supply rail (HV-). In order to achieve this, the VDR- should be connected to the main negative supply rail (HV-) at the amplifier side. The VDR+ must be connected to the amplifier VDR supply input.

The Bootstrap Driver Voltage (VDR) can be specified at the order time 12V , 15V, 18V.

The Bootstrap Driver Voltage (VDR) is an isolated output from all other outputs.

#### SMPS output wiring in Class-D example →



## COBRA-S1 / S2

### COBRA-S1 output power

The output power of this power supply is  
@ 120VAC the output power is 1000W and 1200W PEAK, and @ 230VAC the output power is 1500W and 1900W PEAK.

However, The COBRA-S1 is designed for music reproduction and is therefore not able to deliver its Maximum output power for long-term.  
The RMS value of any common music signal generally doesn't exceed 1/8th of the maximum peak power.

The maximum long-term test conducted was for 20 seconds @ (120VAC) full load with forced air.

### Thermal consideration

The COBRA-S1 will heat in idle (**RUN MODE**) and it may hit 45C in hot environments.

The COBRA-S1 thermal protection is set at 70C, and this value cannot be changed without modification of the SMPS. If the SMPS enters thermal protection you must use the FAN in that case.

### Power supply bus pumping

The COBRA-S1 is an unregulated SMPS, therefore bus pumping will occur when used with class-d amplifiers.  
There are two possible solutions to overcome this issue.

- 1- Use extra capacitance at the output of the SMPS, COBRA-S1 already has enough output capacitance for that purpose
- 2- Operate your amplifiers in out of phase configuration, in stereo mode.

→ **Warning** : The maximum output capacitance the SMPS can accept is **25000uF** per rail, so the total is **50000uF**.  
Increasing that value will simply trip the over current protection.

## Quality of components used

We only use the highest quality components into all the SMPS units we produce.  
What you see in the picture is what you will get, you will get more than what you pay for.



## COBRA-S1 / S2



## Technical Support

Technical support is more important than the product itself, we believe that a product without technical support is a dead product.

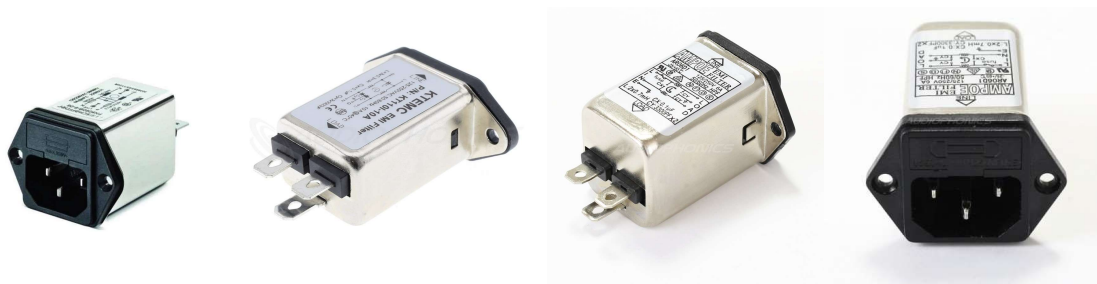
Our SMPS units are covered with 12 months warranty from the date of purchase.

All SMPS we produce can be fixed in case of any problem. As they are not made to be sent to trash if they fail like other manufactures do, we don't ask the customer to send us the unit back to fix it and waste your valuable time.

## Additional EMI / RFI noise filter

Using additional EMI / RFI noise filter is up to you, the SMPS has its own EMI / RFI noise filter , using additional filtering will not harm the installation.

- Use only EMI / RFI noise filter from trusted manufacturers, don't use any cheap chines EMI / RFI noise filters.
- COBRA-S1 or COBRA-S2 requires an EMI / RFI noise filter with 15A fuse rating as minimum.



## COBRA-S1 / S2

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