

## Application Note

## BEN/BEND AC-DC Converter Application Guidelines

### 1. Introduction

The following guidelines should be carefully read prior to converter use. Improper use may result in the risk of electric shock, damaging the converter, or fire.

### 2. Risk Of Injury

- To avoid the risk of burns, do not touch the heat sink or the converter's case.
- Do not touch the input terminals or open the case and touch internal components, which could result in electric shock or burns.
- When the converter is in operation, keep hands and face at a distance to avoid potential injury during improper operation.

### 3. Installation Advice

- Please make sure the input terminals and signal terminals are properly connected in accordance with the stated datasheet requirements.
- To ensure safe operation and meet safety standard requirements, install a slow blow fuse at input of the converter.
- Installation and use of AC-DC converters should be handled by a qualified professional.
- AC-DC converters are used in the primary transmission stage of a design and thus, should be installed in compliance with certain safety standards.
- Please ensure that the input and output of the converter are incorporated into the design out of the reach of the end user. The end product manufacturer should also ensure that the converter is protected from being shorted by any service engineer or any metal filings.
- The application circuits and parameters shown are for reference only. All parameters and circuits are to be verified before completing the circuit design.
- These guidelines are subject to change without notice; please check our website [www.bicker.de](http://www.bicker.de) for updates.

### 4. General AC-DC Converter Applications

- Basic Application Circuit

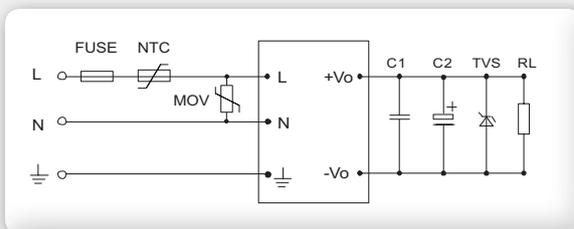


Figure 1. General AC-DC converter applications circuit

In Figure 1, F1 refers to the input fuse. Proper fuse selection should be a safety agency approved, slow blow fuse. Selection of the proper fuse rating is necessary to ensure power converter and system protection (potential failure if the rating is too high) and prevent false fuse blowing (which could happen if the rating is too low).



**Application Note**

Below is the fomula to calculate the proper rating:

$$I = 3 \times V_{o1} \times I_{o1} / \eta / V_{in(min.)}$$

$V_{o1}$  Output Voltage  
 $I_{o1}$  Output Current  
 $\eta$  The converter's efficiency  
 $V_{in(min.)}$  The minimum input voltage

b) EMC filtering circuit

The application circuit shown in Figure 1 is a typical application circuit, for electricity or outdoor applications where EMC is critical, more filtering measures are needed. Figure 2 is a typical input EMC filtering circuit, just for reference.

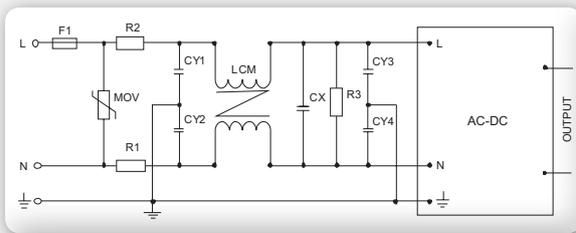


Figure 2. Typical input EMC filtering circuit

- NTC A thermistor. It is suitable for AC-DC converter modules, and is optional. If the application is sensitive to surge current, a winding resistor at 5 ~ 10 Ω is recommended.
- R1, R2 2 Ω / 3W winding resistor
- R3 1 MΩ / 2W
- CX, CY Safety capacitors,  
CX 224K / 275 VAC  
CY 102M / 400 VAC
- LCM Common-mode inductor, is recommended to 10 mH ~ 30 mH
- C1 A high frequency ceramic capacitor or polyester capacitor, 0.1 μF/ 50 V
- C2 A output filtering high frequency electrolytic capacitor. Select a 200 μF rating if the output current is greater than 5 A, or a 100 μF rating if the output current is less than 5 A. The insulation voltage should be derated to less than 80% of rated value.
- MOV Dependent resistor, protect the converter from damage of lightning or surge current, recommended types are:
  - Domestic China type (471KD20, 471KD14)
  - Outside China type (S20K300, S14K300)
 For applications where lightning and surge are critical, we recommend:
  - Domestic China type (471KD20)
  - Outside China type (S20K300)
- TVS Is recommended to protect back-end circuit in cast of the module abnormality.

Specification is subject to change without notice. Errors excepted. Status as at: 29.09.2015