AB/FC500

FREQUENCY CONVERTER SERIES

OPERATING MANUAL
AB/FC500

www.eps-germany.de

The AB/**FC500** frequency converter series was designed electrically and mechanically to achieve optimal ruggedness required for industrial, telecommunications, military and airborne applications.

Electrical Connections

The input can be grounded either on the positive or negative, or may be left floating. The output for the AB/FC 500 is floating.

The input connections are via a 3-pole Phoenix compression connector. GND, PH and N are clearly labeled. The output connections are via a 3-pole Phoenix compression connector. A separate chassis ground is provided. All connections should follow NEC standards.

Location

The unit should be mounted securely to a flat surface with a minimum of one inch clearance to provide ample air flow and to achieve maximum continuous power. Cooling is enhanced if the unit is installed on a metal surface to allow for additional conduction cooling.

Electronic Protection

The frequency converter has a number of protection circuits designed to provide full electronic protection:

Grounding - The input can be either positively or negatively grounded, or may be left floating. The output is floating.

Thermal shut-down - In the event of overheating due to high ambient temperature, blocked air flow or overload conditions, the internal thermal protection circuit will shut the unit down. Operation will automatically resume when the temperature reaches the specified operating level.

Overload and short-circuit protection - In case of an overload or short circuit, the inverter will go into "hiccup" mode. This means that the unit will automatically shut down and will periodically test whether or not the overload condition still exists.

Input and output filtering - All AB/**FC500** frequency converters have a double stage input filter to restrict EMI emissions. Filtering also provides immunity against voltage spikes and other disturbances on the input power line. The inverters meet FCC 20780 Class A and EN 55022 Class A conducted emission requirements.

Operating

Before plugging any appliance into the frequency converter, please refer to its power requirements. Power requirements are indicated in watts (W), volt-amps (VA) or amps (A). Ensure that the rating does not exceed the frequency converter's capacity.

Warranty

Manufacturer's warranty applies for a period of twelve months, subject to application within good engineering practice.

Safety Considerations

WARNING: The AB/**FC500** frequency converters generate 115VAC power – the same voltage coming out of a standard wall outlet. This voltage can be hazardous and has to be treated with the same caution as a regular electrical outlet.

As with any other electrical equipment, the frequency converter must be protected from water and moisture at all times.

Model: AB/FC 500
Summary description: 500VA Frequency Converter
115Vac input to 230Vac/50Hz

Product description:
This AC/AC frequency converter utilizes microprocessor controlled high frequency PWM technology to deliver 500VA with sine wave output voltage. The unit is constructed with field-proven modules to ensure high reliability. The built-in fan provides sufficient airflow for operation without de-rating up to 50°C ambient temperature. This inverter featu high efficiency and filtering to meet EN55022 Class A EMI, with wide margins.
Special feature: ROHS compliant, CE mark

SPECIFICATIONS

Input Voltage
115VAC, 95-132V PFC input
47-63Hz
Max current: 7A

Input Power Factor:
Min. 0.98 at full load for the entire input range. Meets EN61000-3-2.

Input Protection
Inrush current limiting
Varistor
Internal safety fuse
Lower voltage than specified input min. will not damage unit

Isolation
2250Vdc input to chassis/output

Standards
Designed to meet
C22.2 No. 107.1 - 01,
UL 458 and EN60950

EMI
EN 55022 Class A with margins

Output Voltage
~~230Vac/2.2A rms continuous at 50Hz~~
Output is floating

Output Wave Form
Sinusoidal

Total Harmonic Distortion
Less than 5% at full load

Line Regulation
Maximum 0.5%

Load Regulation
± 6% from no load
to full load.

Load Crest Factor
Maximum 3.0 at 90% load

Output Noise
High frequency ripple is better than 500mVrms (20MHz BW)

Output Overload Protection
Current limiting with short circuit protection
Thermal shutdown with automatic recovery in case of insufficient cooling

Output Overvoltage Protection
280V by internal supply voltage limiting

Efficiency
Min 78% at full load

Operating Temperature Range
0° C to +50° C

Temperature Drift
0.05% per degree C over operating temperature range

Cooling
By internal fan

Environmental Protection
Basic ruggedizing

Humidity
5 - 95% non-condensing

MTBF
130,000 hours @45°C
(fans excluded)

Indicators
None

Control Input
None

Alarm Output
None

Package/Dimensions (W x H x L)
I2 case: 127x133.1x393.7mm
(5" x 5.2" x 15.5")

Weight
5 kg (11lbs) approx.

Connections
Input: 3-pole PC4/3-STF-7.62 coded
Output: 3-pole PC4/3-STF-7.62 coded

RoHS Compliance
Fully compliant

Warranty
Two years subject to application within good engineering practice

Input Protection

Low input operation:

Operation below the specified input range is safe for the power supply. After reaching the maximum duty cycle by the pulse width modulator (PWM), the input current and the output voltage start to drop. When the supply voltage for PWM reaches the low threshold the power supply stops to operate. The current draw from the source, at this stage typically is in 20mA range and drops with further input voltage decrease. At the moment when the PWM stops operate the output voltage goes down to zero volt.

High input operation:

Operation above the specified input range is not recommended. Exceeding the maximum input by a few volts and for short period of time usually is harmless for the power supply. Constant operation above maximum specified input may cause failure of the primary section power supply components. This high voltage will not be transferred to the power supply output.

Input transient protection:

The input filter is capable of absorbing small transients. If necessary MOV varistor can be added. For extreme applications an external filter can be added as an option.

Reverse polarity protection:

This is a standard feature on all DC/DC converters. For inputs up to 72V the crossbar diode will act as short circuit and will blow the fuse when the input is applied in reversed polarity. For higher inputs the series diode will act as an open circuit for reverse polarity input.

Input fuse:

The input fuse is installed to protect the incoming line and the power supply from massive damage, in case of the power supply component failure, or foreign object inside of the power supply causing the short circuit. The fuse can not be blown by applying overload or short circuit to the power supply output. It is advised to send the power supply for re testing in case of blown fuse. The power supply with input fuse blown by input transients will require checking of input filter components. The only exception is the fuse failure due to input reverse polarity.

Output Protection

Over Voltage Protection

Over Voltage Protection (OVP) limits the power supply output at safe preset level in case of failure of main feedback loop. The intention of this circuit is to protect the customer equipment, often expensive, from being damaged by excessive voltage from defective power supply. The OVP circuit is very similar to FB loop, however the level is non adjustable, preset at the factory at approx. 120% of the nominal output voltage. The printed circuit board is design so that all tracks for OVP are separated from feedback path, to increase reliability of the circuit.

During normal operation OVP loop in inactive and in most cases stays like this for the entire power supply life. Operation of OVP circuit is verified on each power supply during standard production test.

Overload Protection:

There are two types of the current limiting circuits on Absopulse power supplies. One is the "hiccup" type and the other is the rectangular type of limiting.

Hiccup Type Current Limiting:
The principle of operation is that first the output voltage drops as in the rectangular current limiting. At the level of approximately half of the nominal output voltage, the unit shuts down, and after approximately one second restarts automatically. If the overload or short circuit is still present, the power supply cycles again until the fault is corrected and will then resume normal operation.

Rectangular Type Current Limiting:
The other type of current limiting is the rectangular type. In this mode, the power supply will not shut down even if the output overload or short circuit will force the output voltage to the 0VDC output. There is not latching in this mode and the power supply recovers as soon as the fault clears. This type of current limiting is ideal for all applications when out-rush current is needed (I.e. starting motors, recharging storage capacitors, etc.).

During the overload and short circuit mode, the input current lowers proportionally to the output power. To protect the power supply from over heating in this mode an internal thermostat is used to shut down the power supply when the temperature of the internal components exceeds the pre-determined threshold.

Input/Output Isolation

The input and output of most of our power supplies and converters are fully isolated – the input and output are floating. They can be conneitive or negative ground systems or left floating

Output Ripple/Noise

The input and output of the power supplies are well filtered ensuring a clean, well-regulated output. Any transients/noise seen on the input of the power supply is eliminated during the filtering/power conversion. Without input protection a transient may damage the input of the converter, but it will not pass to the output.

Any noise generated during the switching conversion is filtered at the output. The typical ripple/noise on the output is less than 1% of the output voltage.

GENERAL ENVIRONMENTAL SPECIFICATIONS

Improvements to these specifications are available for custom or customized units.

SHOCK & VIBRATION
All standard Absopulse units without the extra ruggedizing meet Bellcore TR-TSY-0000063 (2G, 5Hz to 200Hz on all axes), and IEC 68-2-27 for 30G shock for 18ms duration, half sine wave; three successive shocks in each direction of three perpendicular axes of the specimen for a total of 18 shocks.

With the ruggedization option, we meet the requirements for MIL810E for shock & vibration.

HUMIDITY CONTROLS
Standard 0 to 95% non condensing. (Optional conformal coating available for fungus / humidity controls)

ALTITUDE
0.... 3,000 metres; no de-rating of temperature range;
3,000... 6,000 metres; de-rate the temperature range by 0.5C per 100m.

TEMPERATURE RANGE
Standard Temperature range for convection /conduction cooled unit is 0ºC to +50ºC.

Low temperature -20ºC or -40ºC (or -55ºC) available as an option.

Above +50C to +70C output power on most units can be de-rated linearly by 2.5% per C rise, please check for specific series. These numbers are based on standard installation and may vary, depending on the particular application

Temperature Drift: 0.03% per degree C over operating
Storage Temperature: –55ºC to +85ºC

ISOLATION
AC Input Units: 2250VDC input to chassis, 4300VDC input to output, 8mm spacing, and 500VDC output to chassis

DC Input units: Vin $\leq$60VDC: 500VDC input to chassis, input to output, and output to chassis; Vin $\geq$60VDC: 2,250VDC input to chassis, & input to output; 500VDC output to chassis.

EMI
EN55022 Class A is a minimum standard. Most units have Class B available. Please refer to the datasheet of the model in question.

SAFETY STANDARDS
All units designed to meet IEC 60950

IMMUNITY (EMC)
All units meet the following minimum levels:

Harmonic Currents	EN61000-3-2. Class D	For PFC input only
ESD air	EN61000-4-2, level 3	Perf. criteria 1
ESD contact	EN61000-4-2, level 4	Perf. criteria 1
Radiated immunity	EN61000-4-3, level 3	Perf. criteria 2
Fast transients	EN61000-4-4, level 3	Perf. criteria 1
Surge	EN61000-4-5, level 3	Perf. criteria 1
Conducted immunity	EN61000-4-6, level 3	Perf. criteria 2
Dips & Interruptions	EN61000-4-11	100% 10ms