

Off-Line Front Ends

Single or Three Phase Strappable

Features

- 250W, 500W, 750W, 115/230Vac Strappable Single-Phase
- 1.5, 3, 5 kW, 208Vac Three-Phase
- 20-50 mS Holdup
- UL, CSA, TÜV, VDE, BABT
- FCC/VDE Class B (single-phase)
- FCC/VDE Class A (three-phase)
- BUS OK, AC OK, DC OK Status Signal
- 96-98% Efficiency
- PC and Chassis Mount
- VI-26X, VI-J6X Series Compatible
- CE Marked

Product Highlights

From AC line in, to highly regulated DC out, Vicor offers the total design solution through a complete family of off-line front end and DC-DC modular power components.

Vicor's family of off-line front ends interface VI-260 and VI-J60 series DC-DC converters, and MegaMods, to 100, 115, 230 or 240Vac single-phase and 208Vac three-phase mains. In addition, front ends provide conducted EMI/RFI filtering to FCC/VDE (Class B single-phase, Class A three-phase), transient surge protection, active inrush limiting, a BUS OK status output (suitable for controlling Vicor DC-DC converter modules via their Gate In pin) and an AC OK status output for system use in the event of loss of the AC line.

Operating Temperature

(Free Convection)

C: 0°C to +50°C (750W: +45°C)

I: -20°C to +50°C (750W: +45°C)

Storage Temperature

-40°C to +80°C

Front End Specifications:

(typical at T = 25°C, nominal line, 75% load, unless otherwise specified)

| | Single Phase (250, 500, 750W) | Three Phase (1.5, 3, 5 kW) |
|---|--|--|
| AC Line Input | Strappable 115/230Vac | 208 Vac +20%/-10% (Wye or Delta, θ to θ) |
| With Range Strap | 90 Vac to 135Vac | N/A |
| Without Range Strap | 180 Vac to 270Vac | N/A |
| Line Frequency | 47 to 63 Hz ("C" Grade) 47 to 440 Hz ("I" Grade) | 47 to 63 Hz ("C" Grade) 47 to 440 Hz ("I" Grade) |
| Line Inrush Current | 115Vac Operation: 35A at peak line 230Vac Operation: 67A at peak line 240Vac Operation: | 52A at peak line |
| AC Leakage Current | 1.9 mA max. at 250Vac, 63 Hz ("C" Grade) | 3.2 mA max. at 208Vac, 63 Hz |
| Power Factor (at full load) | 0.52 to 0.65 (at low line input) | 0.9 (typical at nom. line) |
| Holdup Time (at full load) | Low Line: 250W (60 Hz): 4 ms min. 500, 750W (60 Hz): 7 ms min. Nominal Line: 250W (60 Hz): 27 ms min. 500, 750W (60 Hz): 29 ms. min. | 20 ms min. (47 Hz) |
| AC Fail Warning Time (at full load) | 250W: None 500, 750W: 6 ms min. | 5 ms min. |
| Module Gate Control Output (open drain FET, non-isolated, referenced to -DC output) | Called BUS OK | Called Module Enable |
| ENABLE | Active High (FET cutoff) Vds max. 18V transorb clamp Power up threshold DC bus: 250W: 216V, $\pm 12\%$ 500, 750W: 244, $\pm 3.5\%$ | Active High (FET cutoff) Power-up threshold >227V Vds max: 15V zener clamp |
| ENABLE | Inactive state (DC BUS <190V $\pm 5\%$) Current sinking 100 mA @ .3 Vds max., threshold DC bus 250W: 172V, $\pm 16\%$ 500, 750W: 175V, $\pm 3.5\%$ | Inactive state (DC BUS <187Vdc) Current sinking 100 mA @ .3Vds max. |
| AC OK and BUS OK Status Outputs (optically isolated, transistor output; 500W, 750W only) | 500, 750W only | AC OK and BUS OK |
| Off State Breakdown Voltage | 70Vce max. | 70 Vce max. |
| On State Voltage | .4Vce (sat.) max. at 1 mA | .4 Vce (sat.) max. at 1 mA |
| On State Current | 15 mA max. | 15 mA max. |
| On State Threshold (no load) | 80-89Vac | >210 Vdc/187Vac |
| Off State Threshold (load dependent) | 85-76Vac | <205 Vdc/<182Vac |
| Conducted EMI/RFI Dielectric Withstand | VDE 0871/FCC part 15, Class B AC line (both phases) to GND or case 1.5 kVAC; 2121Vdc | VDE 0871/FCC part 15, Class A AC line (all phases) to GND or case 1.5 kVAC; 2121Vdc |
| Transient Surge Withstand Capability (with no disruption of function) | IEC 61000-4-5, Level 3 | IEC 61000-4-5, Level 3 |
| Common Mode | 1.2/50 μ s, 2 kV, either polarity 0 to 360 degree phase angle with respect to AC line | 1.2/50 μ s, 2 kV, either polarity 0 to 360 degree phase angle with respect to AC line |
| Normal Mode | 1.2/50 μ s, 1 kV pulse, either polarity 0 to 360 degree phase angle with respect to AC line | 1.2/50 μ s, 1 kV pulse, either polarity 0 to 360 degree phase angle with respect to AC line |

Thermal Considerations

Free Convection Derating

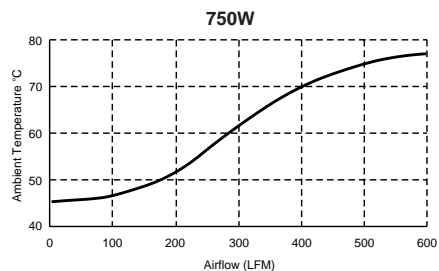
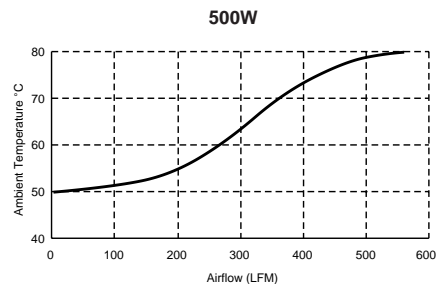
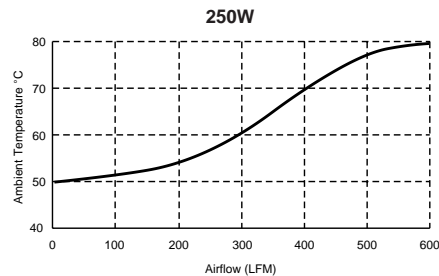
- 250W: Derate output power linearly at 7.2W/°C over 50°C.
- 500W: Derate output power linearly at 14.3W/°C over 50°C.
- 750W: Derate output power linearly at 18.8W/°C over 45°C.

Forced Convection:

The curves below represent worst case data for chassis mounted (enclosed) front ends, i.e., low line, full load. System conditions such as higher line voltage, lighter load or PC mount versions of the front ends will increase reliability if the data here is used as the nominal design criteria.

The sigmoid shape of the curves at low air flows is due to the chassis mount cover restricting the airflow to the inboard components until an airflow of approximately 200 LFM is achieved. Thereafter, the velocity of air rushing over the cover causes air to be pulled in through the side perforations, causing a rapid improvement of cooling of internal components.

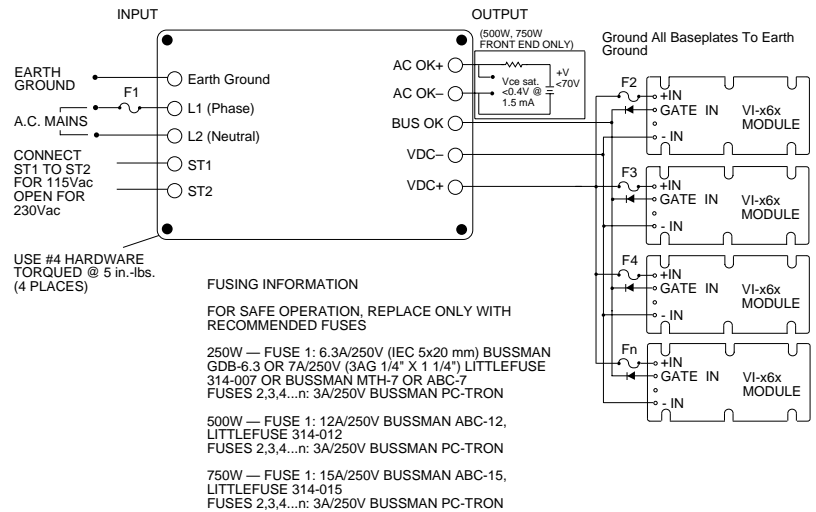
Max. Amb. Temp. vs. Airflow (LFM) Over Cover (Full Load, 90 Vac In, Chassis Mount)



Front End Selection Chart

| Model | Mounting | | Output Power (Watts) | | |
|---------------------|----------|---------|----------------------|-----|-----|
| | PC | Chassis | 250 | 500 | 750 |
| Single Phase | | | | | |
| VI-FPE6-CUX | ■ | | ■ | | |
| VI-FKE6-CUX | | ■ | ■ | | |
| VI-FPE6-CQX | ■ | | | ■ | |
| VI-FKE6-CQX | | ■ | | ■ | |
| VI-FPE6-CMX | ■ | | | | ■ |
| VI-FKE6-CMX | | ■ | | | ■ |
| Three Phase | | | | | |
| VI-TKY6-CHX | | ■ | ■ | | |
| VI-TKY6-CEX | | ■ | | ■ | |
| VI-TRY6-CCX | | ■ | | | ■ |

Front End Connection Diagram



Notes:

1. If input power is applied with the DC output BUS shorted, the active inrush circuitry will usually prevent Fuse 1 from blowing. Remove power, clear shorts, wait a few minutes and reapply input power.
2. If unit is strapped for 115V operation and 230V is applied, the internal overvoltage crowbar will clear Fuse 1. Replace fuse, strap correctly and reapply power.
3. To control EMI/RFI most effectively, the return path to earth ground from either the front end or modules should be made via a good RF ground. User must assure proper grounding for safe operation.