



# Flatpack2 HE Front End

## 48V/3000W Rectifier Module

**The most efficient rectifier in the industry!**



The combination of innovative design, efficiency and reliability makes the Flatpack2 HE Front End rectifier stand out. With efficiency that exceeds **96%**, power losses have been significantly reduced compared to the current industry standard.

This unique rectifier module differs from Eltek's standard range of Flatpack2 rectifiers in that it is designed for operation either with or without batteries, and either stand-alone or in systems. Output is protected with an OR-ing FET, and the module is equipped with I<sup>2</sup>C and CAN buses, auxiliary 12V/500 mA and 5.25V/750 mA output, and discrete I/O signal interfaces.

### Applications

#### Wireless, fiber and fixed line communication

Today's communications demand state of the art, cost effective and compact DC power systems. The Flatpack2 HE Front End rectifier delivers industry-leading power density and superb reliability at the lowest lifetime cost.

The Flatpack2 HE Front End rectifier also has high efficiency at low load, which has been a drawback for most modern soft-switching technologies.

#### Broadband and network access

Increasing network speed demands flexible and expandable DC power solutions. Flatpack2 HE Front End rectifiers are key building blocks for future needs.

#### Power supply for servers and computers

This rectifier is designed for use either with or without batteries, with or without an external control module, and either standalone or in redundant systems.

#### Small and large

Due to its high power density, cost competitive design and a highly flexible communication interface, Flatpack2 HE Front End rectifiers are suitable in system solutions from 3kW to 288kW.

### Product Features and Advantages

#### Flexibility and reliability

Extensive use of digital controllers enables advanced functionality to meet most customers' requirements. It also provides intelligent self-protective features like reduced output power at high temperatures.

To ensure full redundancy in solutions without batteries, the rectifier has an active OR-ing function using a MOSFET transistor, as well as auxiliary 12V and 5V output that can feed an external controller.

#### Plug and play

Plug a new rectifier into an Eltek system, and it automatically logs on, gets an assigned ID, downloads the system set parameters from the control system and starts up with a minimum of installation time—without interrupting the system or attached equipment. It also supports active load-sharing between parallel rectifiers.

In systems delivered without an Eltek controller, the rectifier's main features are still available, including: Active load-sharing, power on/off, AC ok/fail, DC ok/fail. More advanced control/monitoring features are accessible through the I<sup>2</sup>C and CAN communication buses.

## Technical Specifications

AC Input	
Operational Voltage	Nominal range: 200 – 277 VAC Rated range: 100 – 277 VAC
Frequency	45 to 66 Hz
Maximum Current	19.2 A <sub>rms</sub> maximum
Nominal Current	<12.7 A <sub>rms</sub> @ 240 VAC
Power Factor	> 0.99 at 50% load or more @ 230 VAC, 52 VDC
Input Protection	<ul style="list-style-type: none"> <li>o Varistors and spark gap for transient protection</li> <li>o Hot plug-in - Inrush current limiting</li> <li>o Mains fuse in both lines</li> <li>o Disconnect above 300 VAC</li> </ul>

DC Output	
Voltage	>52 VDC (adj. range: 43.5-56 VDC) Start-up delay < 2.7 sec
Output Power	3000 W within nominal input
Maximum Current	62.5A at 48 VDC and nominal input
Output characteristic	48 – 56V: Constant power, 3000W (power derates linearly below 176 VAC) 40 – 48V: Constant current, 62.5A (current limit) Foldback to 12V
Current Sharing	±5% of maximum current from 10% to 100% load
Static voltage regulation	±0.5% from 10% to 100% load
Dynamic voltage regulation	±5.0% for 10-90% or 90-10% load variation, regulation time < 300 µs typical @ 52 VDC
Hold up time	> 20 ms minimum, full power (3000W) @ 52 VDC > 500 ms ride thru at 70% of nominal input
Ripple and Noise	<ul style="list-style-type: none"> <li>o &lt; 250 mV peak to peak, 230 VAC, 40-100% load</li> <li>o 20 MHz bandwidth</li> </ul>
Output Protection	<ul style="list-style-type: none"> <li>o Overvoltage shutdown: Immediate &gt;59.5 VDC Programmable from 44.5 to 59 VDC</li> <li>o Hot plug-in - Inrush current limiting</li> <li>o OR-ing FET</li> <li>o Short circuit protection, foldback</li> <li>o High temperature protection</li> <li>o Under-voltage shutdown, &lt;12V: Foldback w/3 attempts to restart</li> </ul>

Other Specifications	
Efficiency	>95.5% at 30-80% load (208 – 277 VAC) Peak 96.3% @ 277 VAC, 52 VDC
Isolation	3.0 kVAC – input and output 1.5 kVAC – input to earth 100 VDC – output to earth
Alarms, available on I <sup>2</sup> C:	<ul style="list-style-type: none"> <li>o AC failure</li> <li>o High temperature shutdown</li> <li>o Rectifier failure</li> <li>o Overvoltage shutdown on output</li> <li>o Fan failure</li> <li>o Low voltage alarm</li> <li>o Boost failure</li> </ul>
I/O	<ul style="list-style-type: none"> <li>o I<sup>2</sup>C bus</li> <li>o CAN bus</li> <li>o Rectifier failure alarm, potential free</li> <li>o AC failure alarm, potential free</li> <li>o Power on/off</li> <li>o 12V/500 mA auxiliary power output</li> <li>o 5.25V/750 mA secondary auxiliary output</li> </ul>
Visual indications	<ul style="list-style-type: none"> <li>o Green LED: OK</li> <li>o Yellow LED: Warning</li> <li>o Red LED: Alarm</li> </ul>
Operating temp	-30 to +50°C (-22 to +122°F) full power Output power derates linearly from 3000W (w/ nominal input) by 2% per °C above 50°C (up to 75°C)
Storage temp	-40 to +85°C (-40 to +185°F)
Cooling	Fan (front to back airflow)
Fan Speed	Temperature and output current regulated
MTBF	> 441,000 hours Telcordia SR-332 Issue I, method III (a) (T <sub>ambient</sub> : 25°C)
Acoustic Noise	< 55 dBA typical
Humidity	Operating: 5% to 95% RH non-condensing Storage: 0% to 99% RH non-condensing
Dimensions	1.7"H x 4.0"W x 15.8"D (42.2 mm x 102.5 mm x 400.6 mm), includes handle
Weight	2.45 kg (5.4 lbs.)

Applicable Standards	
Electrical safety	IEC/EN609501-1 CSA60950-1-07/UL60950-1 Second Edition
EMC	EN61000-4-4: Electrical fast transient/burst immunity test EN55022 Level B: Radiated Emissions, Conducted Emissions EN61000-4-5: Surge immunity test 6 kV: Line to Line, 6 kV: Line to Ground EN61000-3-2: Limits for harmonic current emissions EN61000-4-6: RF Common Mode EN61000-3-3: Limits for voltage fluctuations and flicker EN61000-4-8: Magnetic Field EN61000-4-2: Electrostatic discharge immunity EN61000-4-11: Voltage dips, short interruptions and voltage variations EN61000-4-3: Radiated immunity 10 V/m

Specifications are subject to change without notice

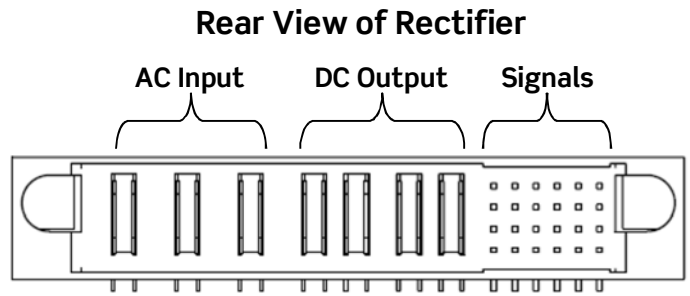
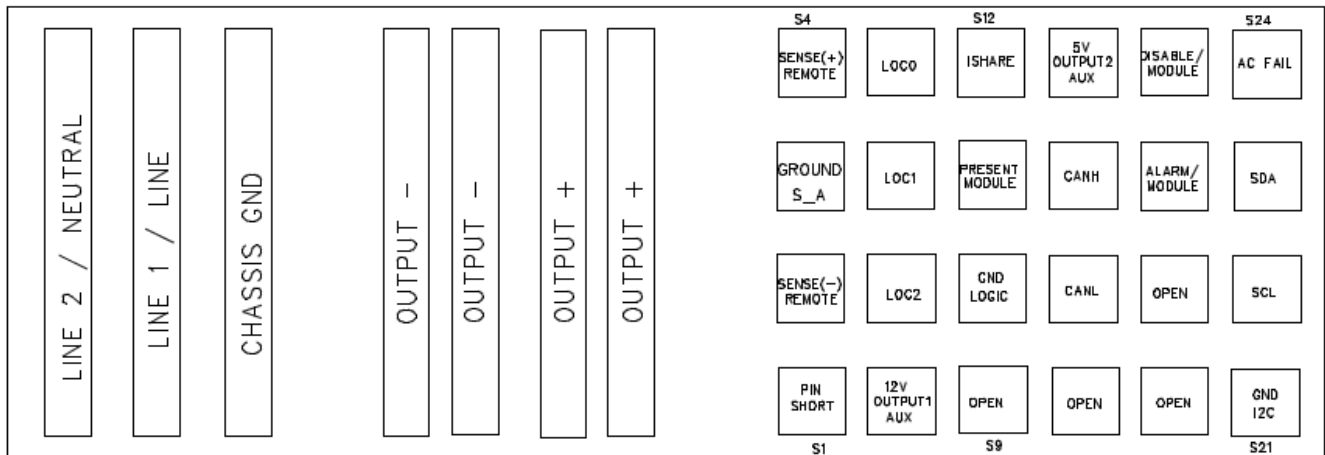
# Flatpack2 Front End Rectifier

## Rectifier Connector Pin-out Requirements

### Connector Information

Module Connector P/N: 51939-573LF  
 Mating Connector P/N: 51866-048LF  
 Connector Manufacturer: FCI/Berg

### Connector Pin-out

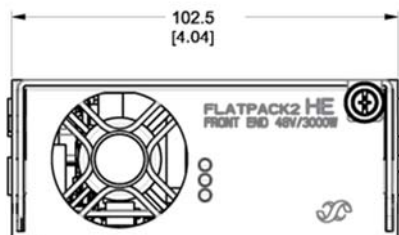


### Dimension Drawings

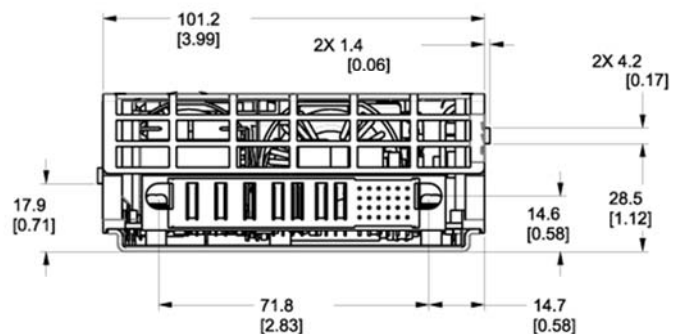
#### SIDE VIEW



#### FRONT VIEW



#### REAR VIEW



## Non-Isolated Signals

### OUTPUT+ and OUTPUT-

These connectors accept power blades for positive and negative power connections.

### REMOTE\_SENSE+ and REMOTE\_SENSE-

These signals are used to compensate for voltage drop across the output distribution. The maximum drop from the rectifier module to the remote sense connection (the complete round trip) must be less than 1V. The remote sense leads may be left unterminated in applications where remote voltage regulation is not required.

### ISHARE

Systems use the CAN bus to load share digitally.

### SHORT\_PIN

The short pin is used to disable the rectifier if it is not fully seated in the slot. It must be tied to OUTPUT- in the shelf backplane in order for the rectifier to provide proper output voltage. The pin must be terminated.

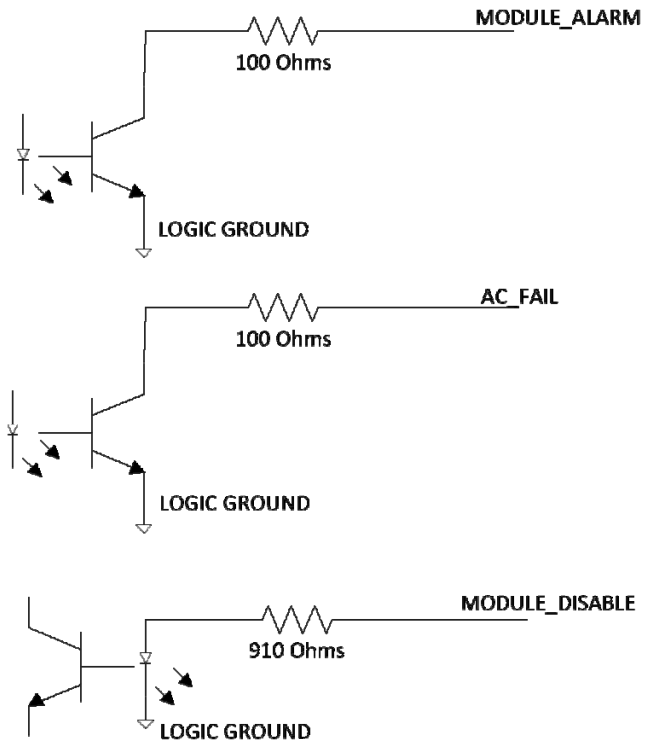
### Address Pins (LOC0, LOC1, LOC2)

LOC0, LOC1, and LOC2 are location pins used to set rectifier address in a system where the I2C bus is shared between rectifiers. They may be left unterminated to generate logic 1 or connected to OUTPUT- to generate logic 0.

### I<sup>2</sup>C Communications Bus (SCL, SDA)

The I<sup>2</sup>C Communications Bus provides information about internal rectifier conditions as well as full control of output voltage and alarming setpoints. SCL and SDA are common data signals and can be wired directly to a system controller or on a common shared bus between the rectifiers in a system and the main system controller. The rectifiers communicate via the proprietary Eltek Communication Protocol. Contact your Eltek representative for technical assistance in interfacing to the rectifiers using this interface protocol. The I<sup>2</sup>C Bus signals are logic referenced to OUTPUT-.

## Isolated Signals



### MODULE\_ALARM

This signal is an opto-isolated open collector signal referenced to LOGIC\_GND within each rectifier. MODULE\_ALARM is a normally closed signal which signifies the presence of an alarm with a high impedance. MODULE\_ALARM is designed to provide a power fail warning to indicate the pending loss of DC voltage during line drop conditions.

### AC\_FAIL

This signal is an opto-isolated open collector signal referenced to LOGIC\_GND within each rectifier. AC\_FAIL is a normally closed signal which signifies the presence of an alarm with a high impedance. AC\_FAIL indicates the presence of valid AC input voltage to the rectifier.

### MODULE\_DISABLE

This signal is a current limited input designed to accept a 3.3V to 5V input voltage. Applying this voltage results in disabling the DC output voltage from the rectifier. This signal may be left unterminated in systems where MODULE\_DISABLE is not required or is implemented via the I<sup>2</sup>C Interface.

