



# Data Sheet

## FlatPAC-EN™

### EN Compliant, Autoranging Switcher

#### Features

- EN61000-3-2 harmonic current compliance
- Low profile package (1.4 in/35,6 mm)
- Output power to 500 W (425 W for EN compliance)
- Up to 4 user specifiable outputs
- "Autosense" feature
- Rugged: Meets MIL-STD-810E for vibration
- Drop-in upgrade to our "2up" FlatPAC
- RS-232 microcontroller interface
- Safety agency approvals: CE Marked, cTUVus
- Vantage line<sup>1</sup>
- RoHS compliant



1.4"H x 5.0"W x 9.2"L  
35,6 x 127,0 x 233,7 mm  
Up to 500W  
1 to 4 Outputs

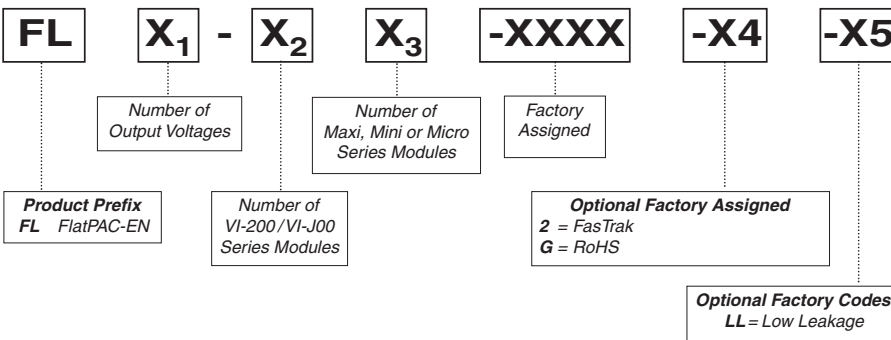
#### Overview

With a power density greater than 7 W/in<sup>3</sup>, Westcor's FlatPAC-EN is an ultra low profile, compact, EN compliant autoranging AC-DC switcher. It is capable of providing up to 500 Watts from up to 4 isolated outputs.

For maximum versatility and flexibility, the FlatPAC-EN can be configured with standard Vicor DC-DC converter modules - full, half and quarter-brick sizes. These modules cover the entire range of outputs from 1 to 100 Vdc and 25 to 500 Watts, as well as an array of non-standard voltages. The optimum FlatPAC-EN solution can be factory configured based on your exact voltage and power requirements.

For conducted EMI, the FlatPAC-EN conforms with FCC Class A and B, and EN55022, Class A and B. (Consult Factory) Further, besides meeting cTUVus and CE safety agency approvals, the FlatPAC-EN complies with harmonic current limits per EN61000-3-2, Electrical Fast Transient/Burst per EN61000-4-4 and Surge Immunity per EN61000-4-5. For harmonic current compliance to EN61000-3-2, do not exceed input current of 3.33 A rms at 230 Vac, 50 Hz.

#### Part Numbering



#### Autosense Feature\*

This is a feature implemented in all converter slots in the FlatPAC-EN. If remote sense connections are not needed or are inadvertently not made, no local sense connections are necessary. Simply connect the output(s) to the load and the converter(s) will automatically operate in the local sense mode. If remote sense connections are made, the unit will operate in remote sense mode.

\*Applies to outputs utilizing full or half size converters.

<sup>1</sup>The Vantage line is Westcor's affordable power supply option. Minor variances in some specifications between the Vantage and the standard line apply. Contact factory for more information.

## DC Output Selections

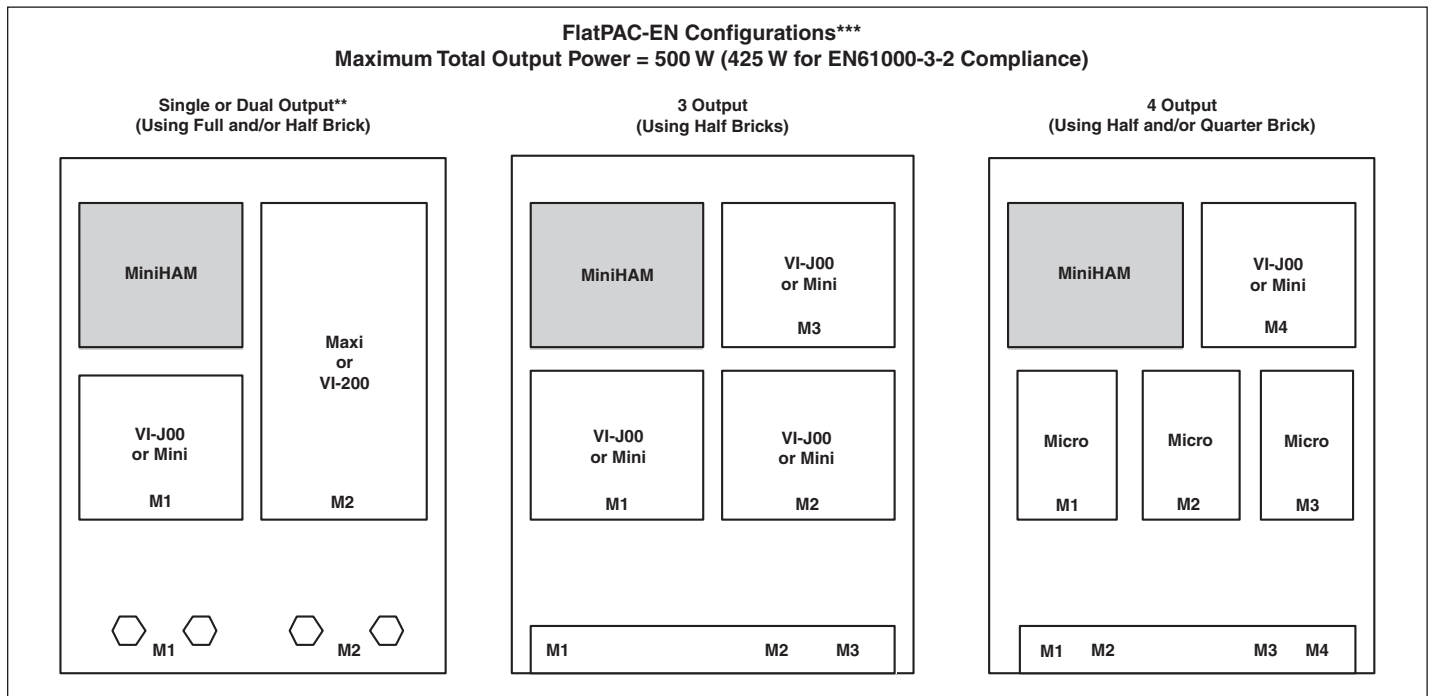
The tables below show a sampling of some of the most popular standard outputs that can be configured into the FlatPAC-EN.

Output Voltage	Available Power (W) per Package Size						
	Full-Brick			Half-Brick			Quarter-Brick
	Maxi	VI-200		Mini	VI-J00		Micro
2 Vdc	160	80	60	100	40	30	50
3.3 Vdc	264	132	99	150	66	50	75
5 Vdc	400	200	150	200	100	75	100
12 Vdc	500	200	150	250	100	75	150
15 Vdc	500	200	150	250	100	75	150
24 Vdc	500	200	150	250	100	75	150
28 Vdc	500	200	150	250	100	75	150
48 Vdc	500	200	150	250	100	75	150

## FlatPAC-EN Configurations

Vicor's DC-DC converter modules are used to populate the FlatPAC-EN. There are several configurations available depending on module size, power limitation and location of the MiniHAM\*.

The two-output FlatPAC-EN contains 1 full-brick and 1 half-brick. The three-output FlatPAC-EN contains 3 half-bricks. The four output FlatPAC-EN contains 1 half-brick and 3 quarter-bricks. See below.



Note: The FlatPAC-EN is limited to a maximum output power of 500 W regardless of the module capability. For example, if three Mini modules are used, the maximum output power for the FlatPAC-EN is still 500 W irrespective of the maximum output power of the modules. For EN61000-3-2 harmonic current compliance, input current of 3.33 A rms should not be exceeded.

\* The MiniHAM is a passive harmonic attenuator specifically designed for EN compliance. Unlike active PFC solutions, the MiniHAM generates no EMI, greatly simplifying and reducing system noise filtering requirements. It is also considerably smaller and more efficient than active alternatives and improves the unit's MTBF. It will provide harmonic current compliance at 230 Vac input at up to 425 W of output power.

\*\* For a single output configuration either M1 or M2 is used.

\*\*\* Please note that the output connector is configuration dependent.

## Performance Specifications

The following are typical performance specifications at room ambient temperature, nominal line voltage (115/230 Vac) and 75% load on all outputs, unless specified otherwise. For detail specifications, consult the FlatPAC-EN Design Guide available online at (vicorpower.com).

### ■ INPUT CHARACTERISTICS

Parameter	Typ	Units	Notes
AC Input			
Voltage	90 – 132/180 – 264	Vac	Derates to 260 W @ 90 Vac, 400 W @ 180 Vac
Frequency	47 – 63	Hz	
DC Input			
	250 – 380	Vdc	
Line Regulation	0.2	%	From low line to high line
Inrush Current			
@ 115 Vac	8	A rms	
@ 230 Vac	8	A rms	
Ride Through Time			
@ 115 Vac	12/15	ms	
@ 230 Vac	16/18	ms	
@ Load	500/400	W	
Conducted EMI/RFI			
	FCC Class A, EN55022 Class A		
	FCC Class B, EN55022 Class B		EN55022 Class B Contact Factory
Power Factor	> 0.70		>75% load
Harmonic Current Limits	EN61000-3-2/A14		Input current of 3.33 A rms max. at 230 Vac, 50Hz
Transient Burst Immunity	EN61000-4-4		
Surge Immunity	EN61000-4-5		
Voltage Dips	EN61000-4-11		Criteria B
Dielectric Withstand			
Primary to Chassis GND	1,500	Vrms	
Primary to Secondary	3,000	Vrms	
Secondary to Chassis GND	500	Vrms	

## Performance Specifications (Cont.)

### ■ OUTPUT CHARACTERISTICS

Parameter	Typ	Units	Notes
Setpoint Accuracy	0.5	%	Of Vnom
Load Regulation	0.2	%	No Load to full load
Temperature Regulation	0.005	%/°C	-20°C to +65°C
Long Term Drift	0.02	%/khr	
Output Ripple & Noise			
≤10 Vout	100	mV	20 MHz band width
>10 Vout	1.0	%	20 MHz band width
Voltage Trim Range			
VI-200/VI-J00 modules	50-110	%Vout	±10% on 10 – 15 Vout
Maxi, Mini, Micro modules	10-110	%Vout	Preload may be required
Remote Sense Compensation	0.5	Vdc	Autosense (See page 1)
OVP Set Point	125	%Vout	Not available on VI-200 / VI-J00 Modules
Current Limit	115	%Imax	Autorecovery



### ■ ENVIRONMENTAL CHARACTERISTICS

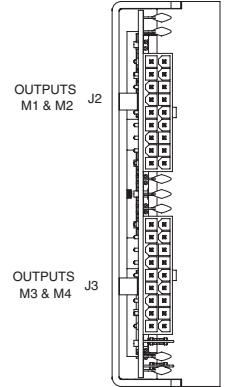
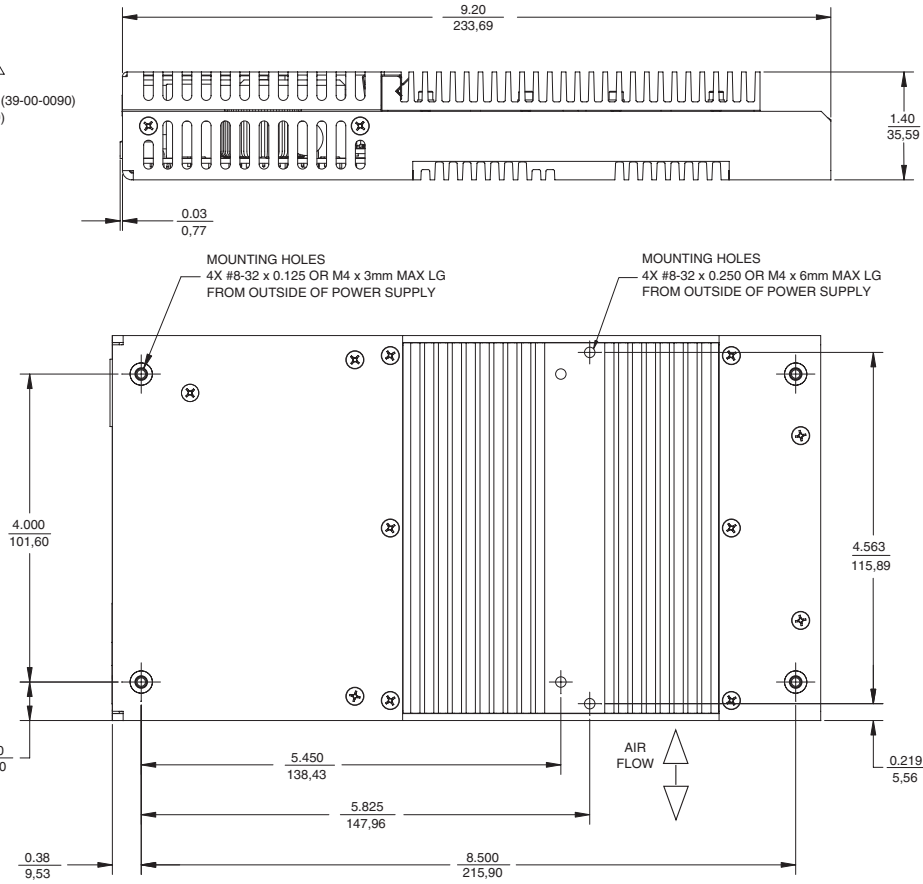
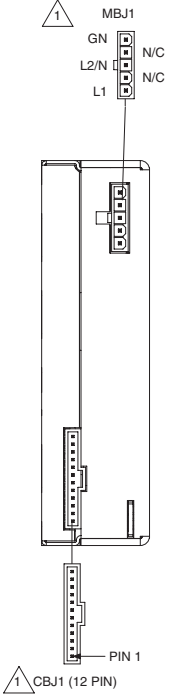
Parameter	Typ	Units	Notes
Storage Temperature	-20 to +100	°C	Standard version
Operating Temperature			
Ambient Air	-20 to +70	°C	See derating curves in Design Guide
Case Temperature	-20 to +90	°C	75° for VI-200 modules
Vibration			MIL-STD-810E, Category 10 Minimum Integrity Test
Safety Approvals	cTÜVus, CE Marked		

### ■ MECHANICAL CHARACTERISTICS


Parameter	Typ	Units	Notes
Weight	3.4	lbs	
	1.5	kg	
Overall Dimensions	9.2 x 5.0 x 1.4	in	L x W x H
	233,7 x 127,0 x 35,6	mm	L x W x H

# Mechanical Diagram



MBJ1 A/C INPUT  
 MATING CONNECTOR:    
 HOUSING: MOLEX (39-01-4051)  
 SOCKET CRIMP 16 AWG: MOLEX (39-00-0090)  
 CRIMP TOOL: MOLEX (11-01-0199)







QUADRUPLE OUTPUT  
 See page 6 and 7 for detailed output connection information.

PIN	REF	DESCRIPTION
CBJ1	SGND	SIGNAL GROUND
CBJ2	N/C	N/C
CBJ3	ACOK	AC POWER OK
CBJ4	TX	TRANSMIT 
CBJ5	RX	RECEIVE
CBJ6	E/D-4	ENABLE/DISABLE
CBJ7	E/D-3	ENABLE/DISABLE
CBJ8	E/D-2	ENABLE/DISABLE
CBJ9	E/D-1	ENABLE/DISABLE
CBJ10	GSD	GENERAL SHUTDOWN
CBJ11	N/C	N/C
CBJ12	+5VS	+5V @ 300mA

### CBJ1 E/D INTERFACE CONNECTOR

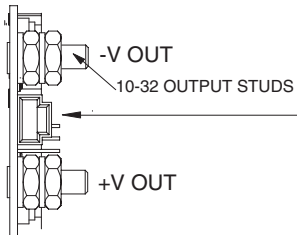
MATING CONNECTOR:    
 HOUSING: MOLEX (50-57-9412)  
 SOCKET CRIMP 24-30 AWG: MOLEX (16-02-0097)  
 CRIMP TOOL: MOLEX (11-01-0209)

### NOTES: UNLESS OTHERWISE SPECIFIED

-  REFERENCE DESIGNATION  
 MB MOTHER BOARD  
 CB CONTROL BOARD
-  CONNECTOR PART NUMBERS SPECIFIED ARE MOLEX OR EQUIVALENT
-  A COMPLETE SET OF MATING CONNECTORS CAN BE PURCHASED FROM WESTCOR BY SPECIFYING CONNECTOR KIT P/N 19-130044
-  CBJ4 AND CBJ5 ARE PART OF THE RS-232 MICROCONTROLLER FUNCTIONS. SEE FLATPAC-EN DESIGN GUIDE (AVAILABLE ONLINE AT VICORPOWER.COM) FOR DETAILED INFORMATION.

# FlatPAC-EN Output Connectors

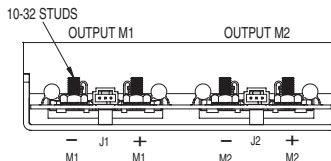
## A. STUD OUTPUT CONNECTORS (When populated with full and/or half-brick modules)



J1/J2 SENSE/TRIM  
PIN CONNECTOR

- |   |         |
|---|---------|
| 1 | TRIM    |
| 2 | + SENSE |
| 3 | - SENSE |

MATING CONNECTOR:  
HOUSING: MOLEX P/N 50-57-9403  
TERMINALS: MOLEX P/N 16-02-0103  
USE CRIMP TOOL: MOLEX P/N 11-01-0208

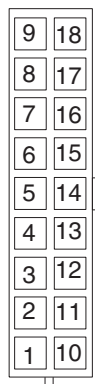


SINGLE OR DUAL OUTPUT

## B. 18 PIN MOLEX CONNECTOR (When populated with half-brick modules)

### Output M1 (using 1 half-brick)

J2

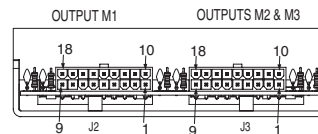


J2 (18 PIN OUTPUT, SENSE  
AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	N/C	10	N/C
2	N/C	11	N/C
3	N/C	12	N/C
4	N/C	13	+ SENSE M1
5	N/C	14	N/C
6	TRIM M1	15	- SENSE M1
7	+V OUT M1	16	+V OUT M1
8	+V OUT M1	17	- V OUT M1
9	-V OUT M1	18	- V OUT M1

MATING CONNECTOR:

18 PIN HOUSING: MOLEX (39-01-2180)  
TERMINAL FEM CRIMP 18-24 AWG: MOLEX (39-00-0039)  
USE CRIMP TOOL: MOLEX (11-01-0197)



TRIPLE OUTPUT

### Outputs M2 and M3 (Using 2 half-bricks)

J3



J3 (18 PIN OUTPUT, SENSE  
AND TRIM PIN CONNECTOR)

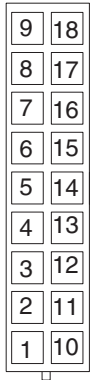
PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M3	10	+V OUT M3
2	-V OUT M3	11	+V OUT M3
3	-V OUT M3	12	-V OUT M3
4	+ SENSE M3	13	+ SENSE M2
5	- SENSE M3	14	TRIM M3
6	TRIM M2	15	- SENSE M2
7	+V OUT M2	16	+V OUT M2
8	+V OUT M2	17	- V OUT M2
9	-V OUT M2	18	- V OUT M2

## FlatPAC-EN Output Connectors (Cont.)

### C. 18 PIN CONNECTOR (When populated with half and/or quarter-brick modules)

#### Outputs M1 and M2 (Using 2 quarter-bricks)

J2



J2 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

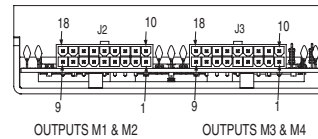
PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M2	10	+V OUT M2
2	-V OUT M2	11	+V OUT M2
3	-V OUT M2	12	-V OUT M2
4	+V OUT M2	13	+ V OUT M1
5	- V OUT M2	14	TRIM M2
6	TRIM M1	15	- V OUT M1
7	+V OUT M1	16	+V OUT M1
8	+V OUT M1	17	- V OUT M1
9	-V OUT M1	18	- V OUT M1

MATING CONNECTOR:

18 PIN HOUSING: MOLEX (39-01-2180)

TERMINAL FEM CRIMP 18-24 AWG: MOLEX (39-00-0039)

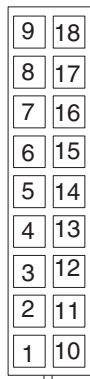
USE CRIMP TOOL: MOLEX (11-01-0197)



QUADRUPLE OUTPUT

#### Outputs M3 and M4 (Using 1 quarter-brick and 1 mini-brick)

J3



J3 (18 PIN OUTPUT, SENSE AND TRIM PIN CONNECTOR)

PIN	DESCRIPTION	PIN	DESCRIPTION
1	+V OUT M4	10	+V OUT M4
2	-V OUT M4	11	+V OUT M4
3	-V OUT M4	12	-V OUT M4
4	+ SENSE M4	13	+ V OUT M3
5	- SENSE M4	14	TRIM M4
6	TRIM M3	15	- V OUT M3
7	+V OUT M3	16	+V OUT M3
8	+V OUT M3	17	- V OUT M3
9	-V OUT M3	18	- V OUT M3

Note: Additional technical information including temperature derating curves, installation instructions, mounting holes, RS-232 microcontroller features covered in the FlatPAC-EN Design Guide available online at vicorpower.com.

## FlatPAC-EN Accessories

The following accessories are available for the FlatPAC-EN:

#### Connector Kits

FlatPAC-EN 19-130044

#### Current Share Boards

Used for increased output power or redundancy

FlatPAC-ENs with VI-200/VI-J00 Modules CSB01

FlatPAC-ENs with Maxi/Mini/Micro Modules CSB02

**Vicor's comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.**

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**Specifications are subject to change without notice.**

*The latest data is available on the Vicor website at [vicorpower.com](http://vicorpower.com).*

Westcor, a division of Vicor, designs and builds configurable power supplies incorporating Vicor's high density DC-DC converters and accessory components. Westcor's product line includes:

- PFC Mini
- PFC Micro
- PFC MicroS
- Autoranging MegaPAC
- Mini MegaPAC
- PFC MegaPAC
- PFC MegaPAC-EL (/Low Noise)
- 3 Phase/4kW MegaPAC
- 3 Phase/4kW MegaPAC-EL (Low Noise)
- ConverterPACs
- FlatPAC-EN

See Design Guides for detailed information about all Westcor products. They can be downloaded in PDF format from the website.



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