

1.4"H x 5.0"W x 9.2"L
35,6 x 127,0 x 233,7mm



EN Compliant, Autoranging Switcher

Features & Benefits

- EN61000-3-2 harmonic current compliance
- Low profile package (1.4in / 35,6mm)
- Output power to 500W (425W 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^[1]
- RoHS compliant

Product Overview

With a power density greater than 7W/in³, the Vicor FlatPAC-EN is an ultra low profile, compact, EN compliant autoranging AC-DC switcher. It is capable of providing up to 500W from up to four isolated outputs.

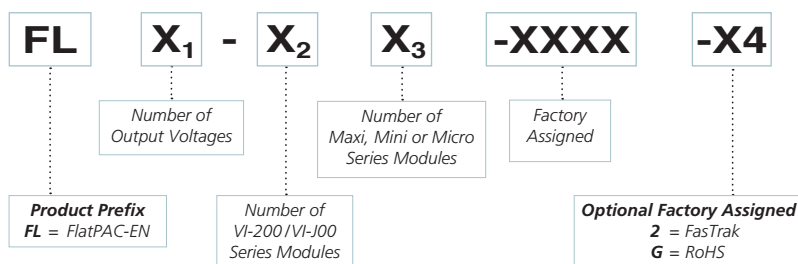
For maximum versatility and flexibility, the FlatPAC-EN can be configured with standard Vicor DC-DC converter modules - full, half and quarter-brick sizes. These modules cover the entire range of outputs from 1 to 100V_{DC} and 25 to 500W, as well as an array of non-standard voltages. The optimum FlatPAC-EN 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 3.33A_{RMS} at 230V_{AC}, 50Hz.

Autosense Feature^[2]

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.

Part Numbering



^[1] The Vantage line is the Vicor affordable power supply option. Minor variances in some specifications between the Vantage and the standard line apply. Contact factory for more information.

^[2] Applies to outputs utilizing full or half size converters.

DC Output Selections

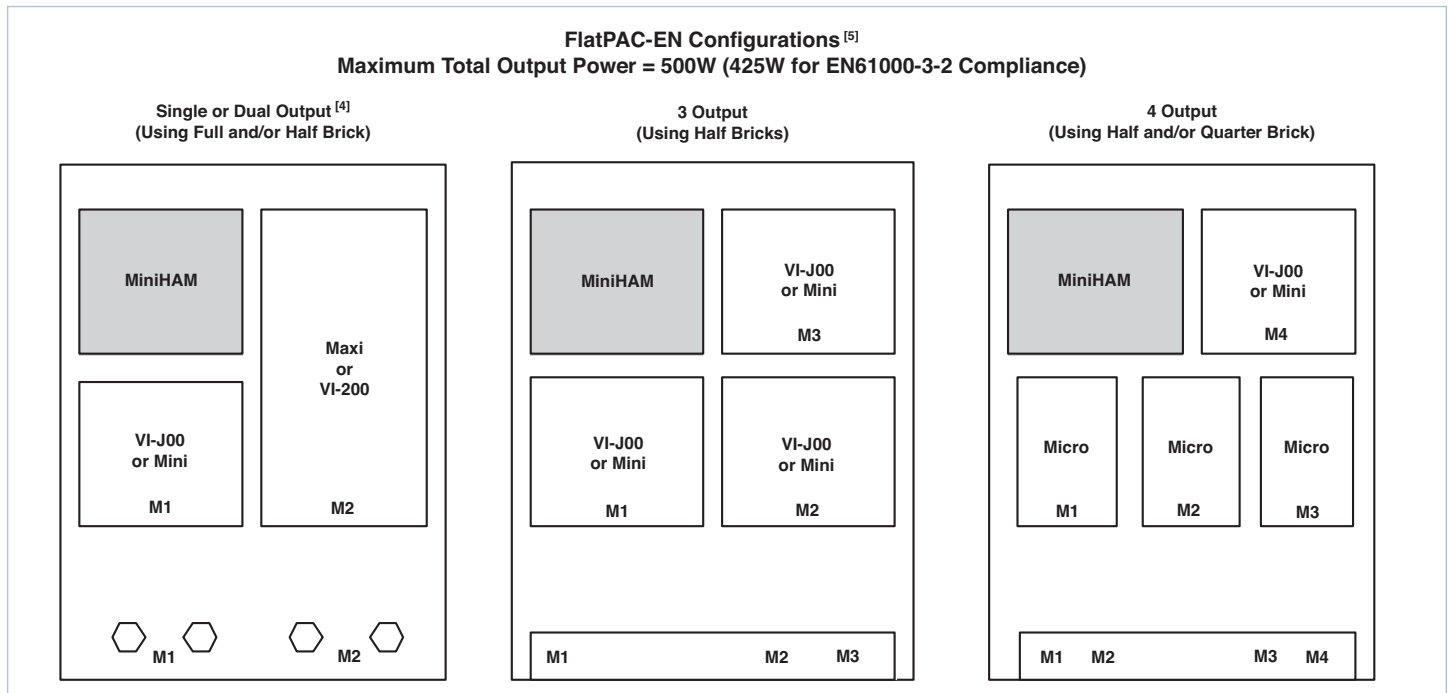
The tables below show a sampling of some of the most popular standard outputs that can be configured into the FlatPAC-EN.

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

FlatPAC-EN Configurations

Vicor 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. ^[3]

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



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

^[3] 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 230V_{AC} input at up to 425W of output power.

^[4] For a single output configuration either M1 or M2 is used.

^[5] 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 / 230V_{AC}) 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	V _{AC}	Derates to 260W @ 90V _{AC} , 400W @ 180V _{AC}
Frequency	47 – 63	Hz	
DC Input	250 – 380	V _{DC}	
Line Regulation	0.2	%	From low line to high line
Inrush Current			
@ 115V _{AC}	8	A _{RMS}	
@ 230V _{AC}	8	A _{RMS}	
Ride Through Time			
@ 115V _{AC}	12 / 15	ms	
@ 230V _{AC}	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 3.33A _{RMS} max. at 230V _{AC} , 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	V _{RMS}	
Primary to Secondary	3,000	V _{RMS}	
Secondary to Chassis GND	500	V _{RMS}	

Performance Specifications (Cont.)

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

Output Characteristics

Parameter	Typ	Units	Notes
Setpoint Accuracy	0.5	%	Of V _{NOM}
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			
≤ 10V _{OUT}	100	mV	20MHz band width
> 10V _{OUT}	1.0	%	20MHz band width
Voltage Trim Range			
VI-200 / VI-J00 modules	50-110	%V _{OUT}	±10% on 10 – 15V _{OUT}
Maxi, Mini, Micro modules	10-110	%V _{OUT}	Preload may be required
Remote Sense Compensation	0.5	V _{DC}	Autosense (See page 1)
OVP Set Point	125	%V _{OUT}	Not available on VI-200 / VI-J00 Modules
Current Limit	115	%I _{MAX}	Autorecovery

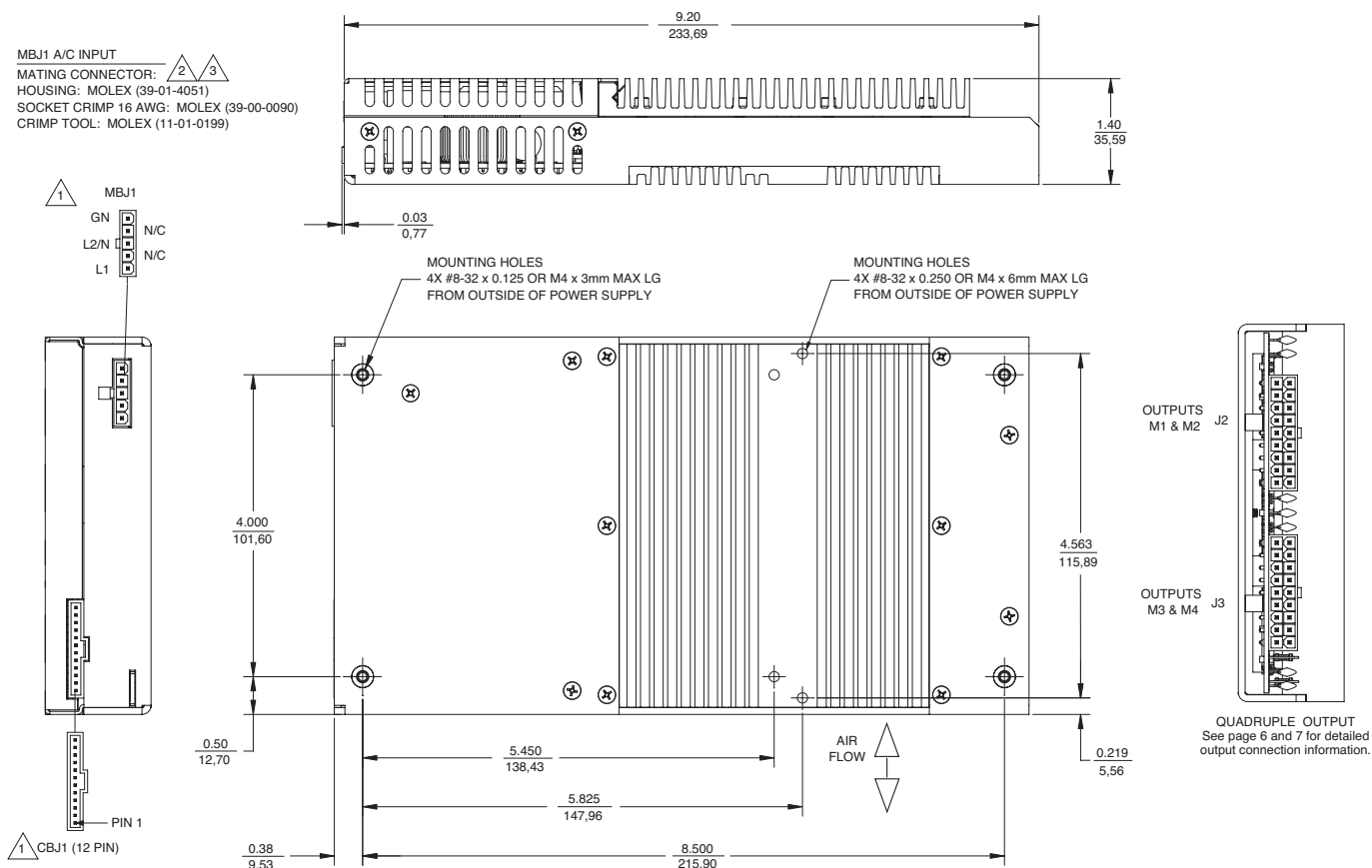
Environmental Characteristics



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 Drawings







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

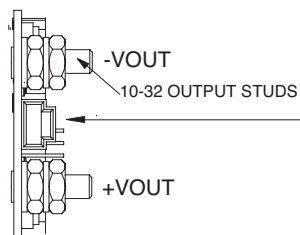
CBJ1 E/D INTERFACE CONNECTOR

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

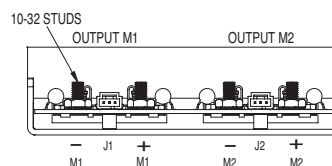
1	TRIM
2	+SENSE
3	-SENSE

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

9	18
8	17
7	16
6	15
5	14
4	13
3	12
2	11
1	10

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

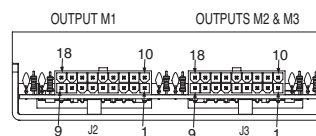
PIN	DESCRIPTION	PIN	DESCRIPTION
1	N/C	10	N/C
2	N/C	11	N/C
3	N/C	12	N/C
4	N/C	13	+SENSE M1
5	N/C	14	N/C
6	TRIM M1	15	-SENSE M1
7	+VOUT M1	16	+VOUT M1
8	+VOUT M1	17	-VOUT M1
9	-VOUT M1	18	-VOUT M1

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

9	18
8	17
7	16
6	15
5	14
4	13
3	12
2	11
1	10

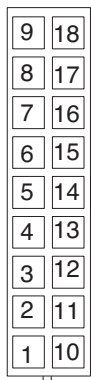
J3 (18 PIN OUTPUT, SENSE
AND TRIM PIN CONNECTOR)

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

FlatPAC-EN Output Connectors

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)

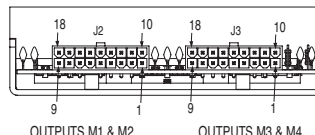
PIN	DESCRIPTION	PIN	DESCRIPTION
1	+VOUT M2	10	+VOUT M2
2	-VOUT M2	11	+VOUT M2
3	-VOUT M2	12	-VOUT M2
4	+VOUT M2	13	+VOUT M1
5	-VOUT M2	14	TRIM M2
6	TRIM M1	15	-VOUT M1
7	+VOUT M1	16	+VOUT M1
8	+VOUT M1	17	-VOUT M1
9	-VOUT M1	18	-VOUT M1

MATING CONNECTOR:

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

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

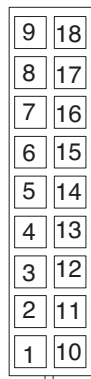
USE CRIMP TOOL: MOLEX (11-01-0197)



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	+VOUT M4	10	+VOUT M4
2	-VOUT M4	11	+VOUT M4
3	-VOUT M4	12	-VOUT M4
4	+SENSE M4	13	+VOUT M3
5	-SENSE M4	14	TRIM M4
6	TRIM M3	15	-VOUT M3
7	+VOUT M3	16	+VOUT M3
8	+VOUT M3	17	-VOUT M3
9	-VOUT M3	18	-VOUT 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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