

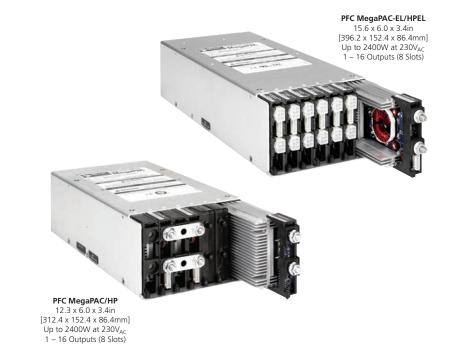
# MegaPAC<sup>™</sup> Family AC-DC and DC-DC Switchers



# **User- and Field-Configurable Power Supplies**

#### **Features & Benefits**

- AC inputs available: 85 264V<sub>AC</sub>, 208 / 240V<sub>AC</sub> 3-Phase
- Power factor corrected (some models)
- Up to 4kW
- DC inputs available: 100 380V<sub>DC</sub>
- User and field configurable
- Compact sizes as small as 3.4 x 6.0 x 9.5in [86.4 x 152.4 x 241.3mm]
- Fan cooled
- Efficiency >80%
- Up to 20 regulated outputs (up to 10 slots) from 1 to 95V<sub>DC</sub> and above
- Full power to 45°C on most products
- OVP, OTL, OCP on most outputs
- Autosense
- Power fail warning
- · Sequencing and general shut down
- Agency approved cTÜVus, CE Marked
- Current Sharing
- Low leakage option available (some models)



#### **Product Description**

The MegaPAC family of products offers four different versions of user configurability to meet almost any set of input and output requirements. Leveraging Vicor modular DC-DC converters, MegaPAC family products combine feature-laden front ends with slide-in output assemblies called ConverterPACs.

User configurability is at the heart of every MegaPAC. A wide variety of the same length ConverterPACs<sup>TM</sup> can be installed, exchanged or removed with the turn of just one screw. This means the MegaPAC can be reconfigured to meet evolving power requirements. Given its range of configurability, the MegaPAC is appropriate for virtually any application from prototype through production.

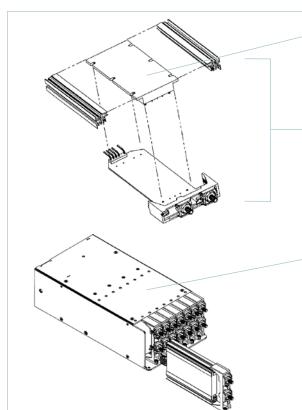


### **MegaPAC Family**

Model	Dimension	Input Voltage	Output Power	Number of Outputs	ConvertPACs™ Per Slot	
Mini MegaPAC™	9.5 x 6.0 x 3.4in [241.3 x 152.4 x 86.4mm]	90 – 132 / 180 – 264V <sub>AC</sub> Strappable 260 – 380V <sub>DC</sub>	1,000W @ 115V <sub>AC</sub> or 230 Vac	1 – 10 (5 slots)	ModuPAC™, JrPAC™, DualPAC™, RamPAC™, BatPAC™	
PFC MegaPAC-EL/HPEL™ [a]	15.6 x 6.0" x 3.4in [396.2 x 152.4 x 86.4mm]	85 – 264V <sub>AC</sub> 100 – 380V <sub>DC</sub>	1,200W @ 115V <sub>AC</sub> 2,400W @ 230V <sub>AC</sub>	1 – 16 (8 slots)	QPAC™, DualQPAC™, JrQPAC™, FinQPAC™ <sup>[b]</sup> (FinQPAC requires 2 slots)	
PFC MegaPAC/HP™	12.3 x 6.0 x 3.4in [312.4 x 152.4 x 86.4mm]		85 – 264V <sub>AC</sub> 2,400W @ 230V <sub>AC</sub> 100 – 380 Vdc 1,200W @ 115V <sub>AC</sub>		ModuPAC, JrPAC, DualPAC, RamPAC, BatPAC, FinPAC™ <sup>[a]</sup> (FinPACs require 2 slots)	
4kW MegaPAC™	14.0 x 7.5 x 4.9in [355.6 x 190.5 x 124.5mm]	208 or 240V <sub>AC</sub> Three Phase 260 – 352V <sub>DC</sub>	4,000W – 3 phase	1 – 20 (10 slots)	ModuPAC, JrPAC, DualPAC, RamPAC, BatPAC, UniPAC™ <sup>[b]</sup>	

 $<sup>^{[</sup>a]}$  Low noise ripple for EL power supplies is  $10 \text{mV}_{\text{P-P}}$  or 0.15% whichever is greater.

# **MegaPAC Configuration**



#### **DC-DC Converter**

At the heart of every MegaPAC are Vicor zero-current switching, DC-DC converters. The modularity of the design combined with the breadth of the product line means virtually any output voltage can be provided.

#### ConverterPAC

ConverterPACs are the slide-in output assemblies that allow each MegaPAC to be easily configured to user-specified output requirements. Using the Vicor DC-DC converter, up to 600W of output power can be provided per ConverterPAC. Larger power needs are easily handled by paralleling ConverterPACs.

#### MegaPAC

Each MegaPAC houses an array of user-selected ConverterPACs to provide a customized power supply. Using a different front end for each product line, almost any input power can be accommodated. The result is a customized power supply with off-the-shelf delivery.

<sup>[</sup>b] ConverterPACs with Maxi module

# **Performance Specifications**

Typical at 25°C, nominal line and 75% load, unless otherwise specified

Parameter	PFC MegaPAC <sup>™</sup> , PFC MegaPAC-HP <sup>™</sup> , PFC MegaPAC-HPEL <sup>™</sup> , PFC MegaPAC-EL <sup>™</sup>	Mini MegaPAC™	4kW MegaPAC™				
	Input Characters	itics					
Input	85 – 264V <sub>AC</sub>	115 – 230V <sub>AC</sub> , Strappable	208 / 240V <sub>AC</sub> , 3-phase, 4 wire 180 – 264V <sub>AC</sub> 1-phase				
Standard Line		47 – 500Hz					
	47 – 63Hz						
Vantage Line	100 – 380V <sub>DC</sub>	260 – 380V <sub>DC</sub>	260 – 352V <sub>DC</sub>				
Line Regulation	0.2%	max from 10% to full load					
In words Comment	25A <sub>PK</sub> at 115V <sub>AC</sub>	204 -+ 2201/					
Inrush Current	25A <sub>PK</sub> at 230V <sub>AC</sub>	80A <sub>PK</sub> at 115 and 230V <sub>AC</sub>	30A <sub>PK</sub> at 230V <sub>AC</sub>				
Ride-Through Time	>20m	s at nominal line, full load					
Power Fail		>3ms warning					
Conducted EMI	EN 55022 Level B (certain configurations)	EN EEO22 Lovel A	EN FEO22 Lovel A				
(47 – 63Hz)	FCC B	EN 55022 Level A	EN 55022 Level A				
Power Factor	0.99 (115V <sub>AC</sub> )	0.65	0.92 (3-phase operation)				
Power Factor	0.98 (230V <sub>AC</sub> )	0.65					
Surge Immunity (Common Mode & Normal Mode)	EN 61000-4-5 Class 3, Performance Critera B						
	Output Character	sitics					
Load Regulation	0.2% max from 10% to full load						
-	0.5% from no load to 10% load						
	Standard Line:1.0% for standard voltages, 2.0% for special or adjustable voltages						
Set-Point Accuracy	Vantage Line: 2.0% for standard voltages, 5.0% for special or adjustable voltages						
	See Vicor module specifications. A preload may be necessary for modules trimmed down below 90% of normal output voltage.						
	Standard outputs: 2% or 100mV <sub>P-P</sub> max whichever is greater, 10% minimum load						
Ripple and Noise	VXI options: $50 \text{mV}_{P-P}$ max for outputs, $\leq 15 \text{V}_{DC}$ ; $150 \text{mV}_{P-P}$ max. $15 \text{V} < \text{V}_{OUT} \leq 24 \text{V}$ ; $1\% \text{ V}_{OUT} > 24 \text{V}$						
(20MHz BWL)	2nd Generation QPAC, FinPAC, FinQPAC and UniPAC performance dependent on the converter module used. (Output of module is unfiltered.)						
	QPAC, DualQPAC, JuniorQPAC, RamPAC: 10mV <sub>P-P</sub> max or 0.15%, whichever is greater.						
Outron and Durate attent	105 –130% > 5V outputs						
Overcurrent Protection	30 – 125% ≤ 5V outputs						
Overvoltage Protection	ModuPACs and QPACs: 115 – 135%						
Efficiency	80% typical	82% typical	82% typical				
	1,600W at 40°C (230V <sub>AC</sub> ) PFC MegaPAC; PFC MegaPAC-EL (Low Noise)		4,000W at 45°C (3-phase)				
Output Power	2,400W at 40°C (230V <sub>AC</sub> ) PFC MegaPAC HP, PFC MegaPAC HPEL	1,000W at 45°C (115 / 230V <sub>AC</sub> )	1,500W at 45°C (1-phase)				
	1,200W at 40°C (115V <sub>AC</sub> ) PFC MegaPACs	ACs .,,555.7 dc 75 C (1 p					



# **Performance Specifications (Cont.)**

Typical at 25°C, nominal line and 75% load, unless otherwise specified

Parameter	PFC MegaPAC™, PFC MegaPAC-HP™, PFC MegaPAC-HPEL™, PFC MegaPAC-EL™	Mini MegaPAC™	4kW MegaPAC™					
Environmental								
Storage Temperature	−40 to +85°C							
Operating Temperature [c]								
Vantage Line Full Power	0 to +40°C	0 to +45°C	0 to +45°C					
Vantage Line Half Power	0 to +60°C	0°C 0 to +65°C						
Standard Line Full Power	−20 to +40°C	−20 to +45°C	−20 to +45°C					
Standard Line Half Power	−20 to +60°C	−20 to +65°C	−20 to +65°C					
Cafaty Agangy Annroyals	cTÜVus							
Safety Agency Approvals	CE Marked for Low Voltage Directive and RoHS Recast Directive, as applicable							
	9.75lbs [4.43kg] (PFC MegaPAC & HP)							
Product Weight (Fully Configured)	12.8lbs [5.8kg] (PFC MegaPAC EL)	6.25lbs [2.84kg]	22.0lbs [10kg]					
	13.0lbs [6.0kg] (PFC MegaPAC HPEL)							
Limited Warranty	2 Years							

<sup>[</sup>c] PFC MegaPACs: The maximum operating temperature is 40°C. If using a VI-200™ with output voltage <12V and >150W, the operating temperature decreases to 35°C. This also applies when using a FinPAC™ with output voltage <24V and >500W. Mini MegaPAC & 4kW MegaPACs: The operating temperature is 45°C using any combination of modules and output voltages as long as the front-end rating is not exceeded. Normal derating applies to half power if the ambient temperature is 20°C hotter.



# **MegaPAC™** Family

#### **ConverterPAC™** Overview

- Output voltages from 2 95V<sub>DC</sub>
- Output power up to 600W
- DC OK
- Adjustment ranges from 50% to 110% of nominal

- Autosense / Remote Sense
- Low noise option:10mV<sub>P-P</sub> or 0.15%, whichever is greater
- 80 90% efficiency
- Current source outputs available



# **MegaPAC Configuration for MegaPAC Family Product**

Converters		Module(s) Used	Maximum Output Power					
VE-200 and VE-J00 ConverterPACs								
	ModuPAC™ (M) (RoHS – GM)	1 VE-200 DC-DC Converter	Up to 200W per ConverterPAC					
	RamPAC™ (R) (RoHS – GR)	1 VE-J00 DC-DC Converter 1 Ripple Attenuator Module (VI-RAM)	Up to 100W for applications requiring low ripple / noise					
	DualPAC™ (D) (RoHS – GD)	2 VI-J00™ DC-DC Converters	Dual Output; Up to 100W each output					
	JuniorPAC™ (J) (RoHS – GJ)	1 VI-J00 DC-DC Converter	Up to 100W					
	BatPAC™ (B) (RoHS – GB)	1 VI-200™ BatMod	A 200W programmable current source that can be configured as a battery charger					
	QPAC <sup>TM [d]</sup> Low Noise (L) (RoHS – GL)	1 VI-200 DC-DC Converter with differential- and common-mode filters	Up to 200W for applications requiring as low as 10mV <sub>P-P</sub> output noise					
	JrQPAC™ <sup>[d]</sup> Low Noise (U) (RoHS – GLJ)	1 VE-J00 DC-DC Converter with differential- and common-mode filters	Up to 100W					
	DualQPACTM <sup>[d]</sup> Low Noise (LD) (RoHS – GLD)	2 VI-J00 DC-DC Converters with differential- and common-mode filters	Dual Output; Up to 100W each output					
J-441		Maxi ConverterPACs						
	UniPAC™ (XU) (RoHS – GXU)	1 Maxi DC-DC Converter	Up to 500W; Applicable for 3-phase / 4kW product					
	FinPAC <sup>TM [e]</sup> (PZ) (RoHS – GPZ)	1 Maxi DC-DC Converter	Up to 600W; Applicable for PFC MegaPAC High Power					
	FinQPAC <sup>™ [e]</sup> (PZL) (RoHS – GPL)	1 Maxi DC-DC Converter with discrete output filter	Up to 600W; Applicable for PFC MegaPAC-HPEL					

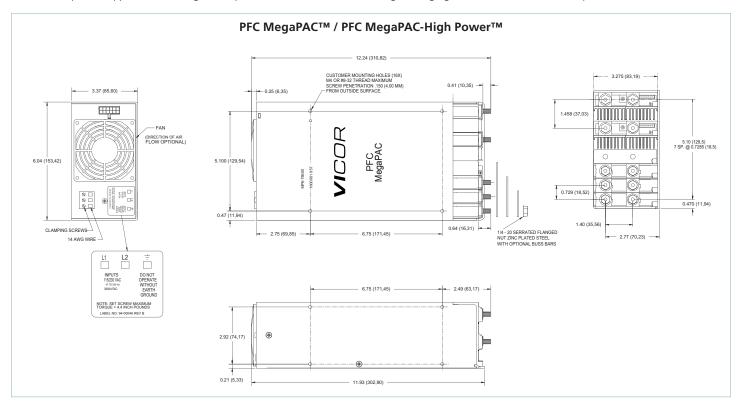
<sup>&</sup>lt;sup>[d]</sup> Only for the extended-length MegaPACs

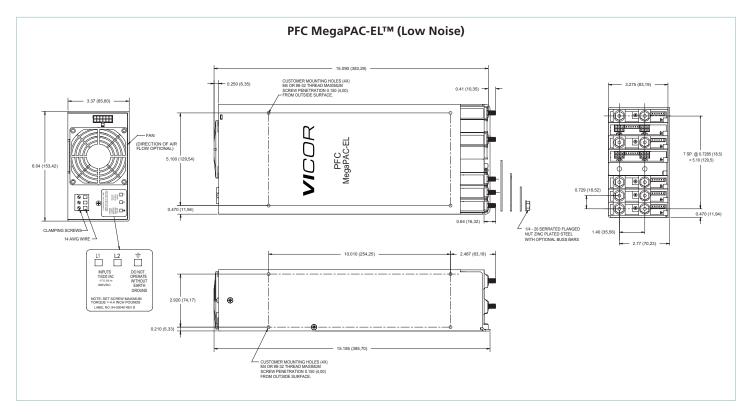


<sup>[</sup>e] FinPACs and FinQPACs require two (2) slots.

## **MegaPAC Mechanical Drawings**

Note: Newer power supplies have redesigned output studs which are 1/8th inch longer. Design guides available online at vicorpower.com for more details.

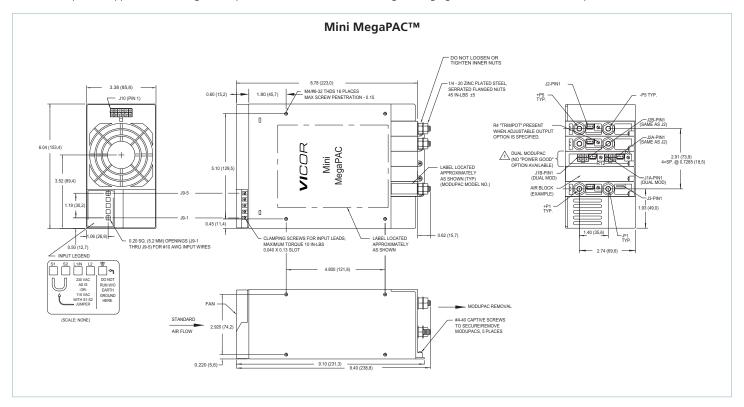


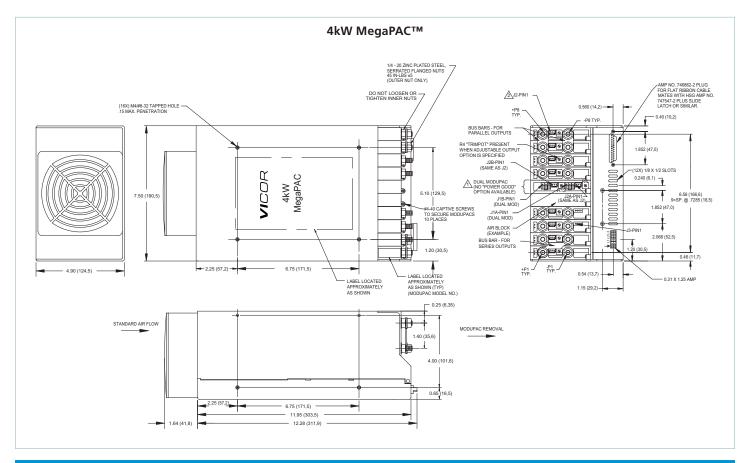




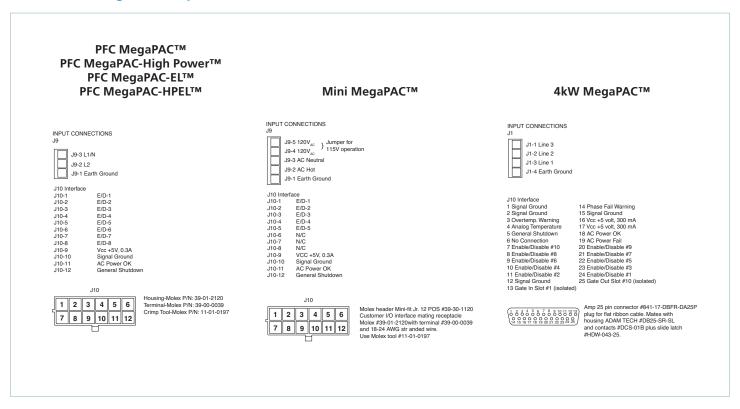
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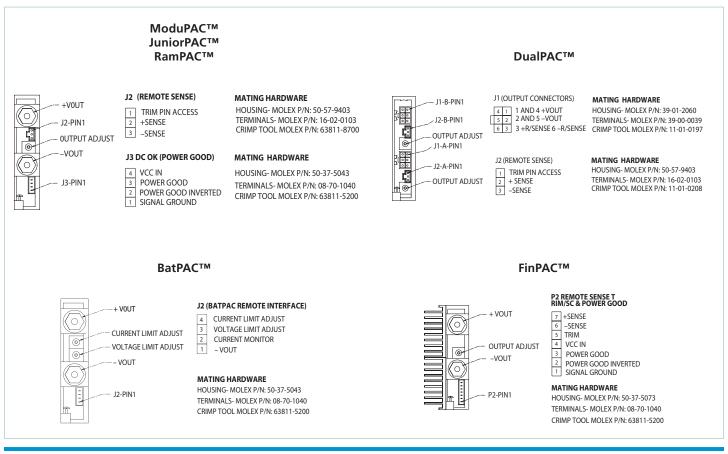




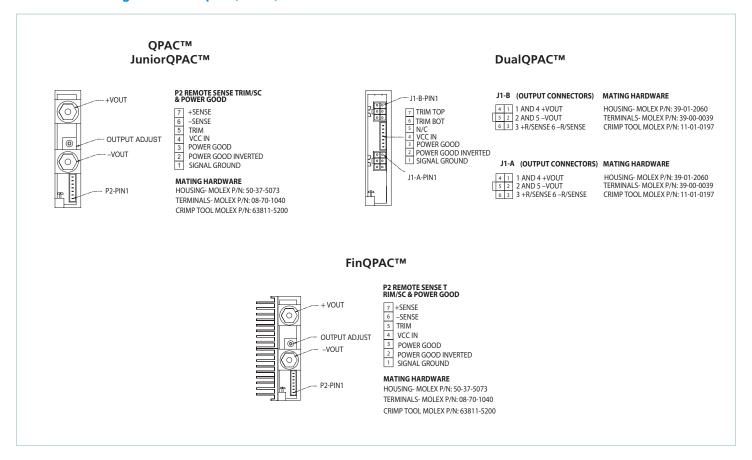
### **Connection Diagrams – Input**



## **Connection Diagrams – Output**



## **Connection Diagrams – Output (Cont.)**



#### **ConverterPAC™ Options**

Option	ModuPAC™ (M)	BatPAC™ (B)	DualPAC™ (D)	JuniorPAC™ (J)	RamPAC™ (R)	DualQPAC™ (LD)	QPAC™ (L)	JuniorQPAC™ (LJ)	UniPAC™ (XU)	FinPAC™ (PZ) <sup>[f]</sup>	FinQPAC™ (PLZ) <sup>[f]</sup>
D Power Good	OPT	NA	NA	OPT	OPT <sup>[i]</sup>	OPT <sup>[i]</sup>	OPT	OPT	OPT	OPT	OPT
T Trim: +10%/–10%	OPT <sup>[g]</sup>	NA	OPT	OPT <sup>[g]</sup>	OPT <sup>[g]</sup>	NA	OPT <sup>[g]</sup>	OPT	OPT	OPT	OPT
F Trim: +10%/–50%	OPT <sup>[g]</sup>	NA	OPT	OPT <sup>[g]</sup>	OPT <sup>[g]</sup>	NA	OPT <sup>[g]</sup>	OPT	OPT	OPT	OPT
V1 VXI Low Noise (150mV <sub>P-P</sub> $15V < V_{OUT} \le 24V$ )	ОРТ	NA	OPT	OPT	NA <sup>[h]</sup>	NA <sup>[h]</sup>	NA <sup>[h]</sup>	NA <sup>[h]</sup>	NA	NA	NA <sup>[h]</sup>
V2 VXI Low Noise $(50 \text{mV}_{P-P} \le 15 \text{V})$	OPT	NA	OPT	OPT	NA	NA	NA	NA	NA	NA	NA
V3 VXI Low Noise (1% V <sub>OUT</sub> > 24V)	OPT	NA	OPT	OPT	NA	NA	NA	NA	NA	NA	NA
Parallelable	STD	STD	NA	NA	NA	NA	STD	NA	STD	STD	STD
Autosense	STD	NA	STD	STD	NA	STD	STD	STD	STD	STD	STD

<sup>&</sup>lt;sup>[f]</sup> FinPACs and FinQPACs require two slots.



 $<sup>^{[</sup>g]}$  Module dependent, 3.3V, 10-15V "T" option only.

<sup>&</sup>lt;sup>[h]</sup> All QPACs and RamPACs have output ripple of 10mV<sub>P-P</sub> or 0.15% whichever is greater.

<sup>[</sup>i] Per slot-based indicator.

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