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Mini MegaPAC™ AC-DC Switcher

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Overview

The Mini MegaPAC AC-DC switcher allows users to instantly configure high-efficiency, off-line power supplies that operate on either 115 or 230V_{AC} (47 – 500Hz) or 260 – 380V_{DC}. Although small in size (3.4 x 6.0 x 9.5in [85,8 x 153,4 x 241,3mm]), the Mini MegaPAC provides up to 1,000W of output power. The chassis has five slots and can provide up to ten isolated outputs.

A complete power supply is configured at the factory by selecting and inserting up to five same-length, slide-in output assemblies called ConverterPACs™. ConverterPACs incorporate one or two VI-200™ / VI-J00™ and/or Maxi Vicor DC-DC converters and are available in a wide array of output voltages and power levels. The net result is a power supply that offers the advantages of a custom supply but is assembled from standard and modular building blocks. For detailed information about the ConverterPACs, refer to the ConverterPAC data sheets. The ConverterPACs used in the Mini MegaPAC use VE-2xx and VE-Jxx modules.

Manufactured at Vicor, the entire family of MegaPAC power supplies is completely user-configurable. If output requirements change, i.e., more power or a different output voltage is needed, upgrading is easy: simply unlock a single screw and replace the slide-in ConverterPAC assembly with one of the same length and has the desired voltage power rating. For additional flexibility, ConverterPACs can be connected in parallel to increase output power (booster ConverterPACs), or in series for higher voltages (total output voltage should not exceed 400V). The driver is to the left of the boosters when looking at the output end of the supply. A user-friendly interface provides control and output sequencing capability, in addition to useful status indicators. Please consult our Applications Engineering Department if you have other special requirements.

Note: This user guide contains references to parts and products that are no longer available for new designs. They remain included for reference only.

Standard Features

- Input voltage: 90 – 132V_{AC} or 180 – 264V_{AC}, 47 – 500Hz, or 260 – 380V_{DC}
- Output power: 1,000W @ 115V_{AC} or 230V_{AC}
- Outputs: five slots (up to ten outputs)
- Full-power output to 45°C; half power to 65°C
- Fan cooled
- Conducted EMI meets EN55022 Class A and B
- AC Power OK status signal
- RoHS compliant available
- Output Sequencing and General Shut Down (Consult Applications Engineering for automatic sequencing circuitry)
- Autosense (refer to pages 11 and 14 for more information on Autosense)
- Overcurrent protection standard on all outputs
- Output overvoltage protection on all ConverterPAC™ outputs with VI-200™ module
- Output overtemperature limiting on all ConverterPAC outputs with VI-200 module
- Size: 3.4 x 6.0 x 9.5in [85,8 x 153,4 x 241,3mm]
- Safety Agency Approvals: CE Mark, cTÜVus

Optional Features

- DC OK status signal
- Reversed fan air-flow direction
- Extended temperature range DC-DC converters
- Current share boards (see pages 22 – 24)
- Low-leakage version (see page 25)

Mechanical Considerations

The Mini MegaPAC™ can be mounted on any of four surfaces using standard 8-32 or 4mm screws. The chassis comes with four mounting points on each surface; maximum allowable torque is 20lb·in. The maximum penetration is 0.15in [3,8mm].

When selecting a mounting location and orientation, the unit should be positioned so air flow is not restricted. Maintain a 2in [5,1cm] minimum clearance at both ends of the Mini MegaPAC and route all cables so air flow is not obstructed. The standard unit draws air in at the fan side and exhausts air out the load side. If air-flow ducting is used, avoid sharp turns that could create back pressure. The fan moves approximately 30CFM of air.

Avoid excessive bending of output power cables after they are connected to the Mini MegaPAC. For high-current outputs, use cable-ties to support heavy cables and minimize mechanical stress on output studs. Be careful not to short-out to neighboring output studs. The Mini MegaPAC is supplied with serrated, flanged hex-nuts on all output studs. Therefore, thread-locking compounds or lock washers are not required. The maximum torque recommended on flanged nuts is 45lb·in. Never loosen the inner nut on a ConverterPAC. This nut supports the hardware inside the ConverterPAC and is factory torqued.

Avoid applications in which the unit is exposed to excessive shock or vibration levels. In such applications, a shock-absorption mounting design is required.

MegaPAC Dos and Don'ts

- For units without Autosense, **do not leave ConverterPAC™ sense lines open.** Always terminate them to their respective output locally or at the load. Use twisted pair 22 – 24AWG wire. If ConverterPAC has Autosense, no local sense connection is required. See pages 11 and 14 for more information on Autosense.
- If needed, use Connector Kit #19-130040 for the Mini MegaPAC™.
- **Always fill all output slots of the MegaPAC. If a slot is not filled with a ConverterPAC, it should be filled with an airblock.** Airblocks are plastic assemblies whose main function is to fill up an empty slot. Any air flow escape from an empty slot significantly degrades thermal performance and **can result in overheating and damage to the power supply.**
- **Do not unplug ConverterPACs while input power is applied. They are not designed for hot-plug applications.**
- Do not restrict air flow to the unit. The fan draws air into the unit and forces it out at the output power terminals.
- Single-output ConverterPACs should NOT be paralleled directly together.
- For power expansion, use booster ConverterPACs. Viewing the unit from the output terminal side, always insert boosters to the right side of the driver. For booster arrays, **do not power up with bus bars removed.**
- Always ensure that output hex-nuts are properly torqued before applying power to supply.
- Do not use boosters as independent outputs. Disconnecting bus bars will damage booster ConverterPACs.
- Run the output (+/–) power cables next to each other to minimize inductance.
- Wait five minutes after shutting off power before inserting or removing ConverterPACs.
- The MegaPACs do not have user-serviceable components. They must be returned to the factory for repairs. Contact Customer Service for a RMA number before returning the unit. Do not attempt to repair or modify the power supply in any manner other than the exchange of ConverterPACs as described in this User Guide.
- Insert proper fault protection at power supply input terminals (i.e., a fuse).
- Use proper-size wires to avoid overheating and excessive voltage drop.
- Never loosen the inner nut on a ConverterPAC. Verify output nuts are tight before powering up.
- Output voltages over $60V_{DC}$, whether from individual modules or series arrays, are considered as hazardous secondary outputs under UL60950. Appropriate care must be taken in design implementation of the supply.
- Only use the regular-length ConverterPACs in the Mini MegaPAC. One cannot use any of the Extended-Length ConverterPACS in the Mini MegaPAC. The ELs are only used in the EL (low-noise) products.

Technical Description

The Mini MegaPAC™ chassis consists of an off-line single phase AC front end, EMI filter, cooling fan, customer interface and associated housekeeping circuits. Input AC mains voltage (L1/N, L2 and GND) is applied to a terminal block. The input current is passed through an EMI filter designed to meet EN55022 Class A and B. At start up, inrush current is limited by an NTC thermistor prior to being passed to the power rectifiers. The power rectifiers and filter capacitors are arranged in a conventional full-wave bridge rectifier / voltage-doubler configuration. This operates as a full-wave bridge rectifier on $230V_{AC}$ or can be manually strapped for operation as a voltage doubler on $115V_{AC}$, delivering unregulated $300V_{DC}$ to a high-voltage backplane. The backplane supplies power to a variety of ConverterPAC™ assemblies that provide the desired low-voltage, regulated outputs.

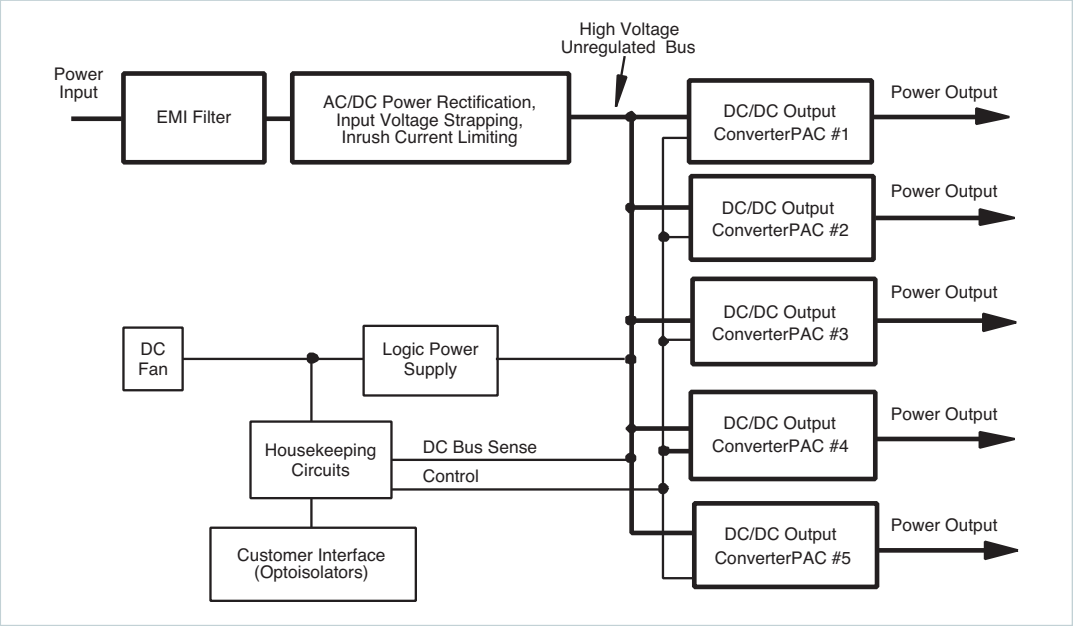
Voltage conversion in the output assemblies is achieved by the Vicor family of Zero-Current Switching (ZCS) DC-DC converters. These are forward converters in which the main switching element switches at zero current. This patented topology has a number of unique attributes: low switching losses; high-frequency operation resulting in reduced size for magnetics and capacitors; excellent line and load regulation; wide adjustment range for output; low EMI / RFI emission and high efficiencies.

At initial power-up, the Mini MegaPAC™ outputs are disabled to limit the inrush current and to allow the DC bus potential to settle out to the correct operating level. A low-power flyback converter operating with PWM current-mode control converts the high-voltage DC bus into regulated low voltage to power the internal housekeeping circuits and DC cooling fan. When operating on $115V_{AC}$, the internal housekeeping V_{CC} comes up within two seconds after the application of input power. On $230V_{AC}$, it comes up within 500ms. Once the bus potential is within operating parameters, the AC Power OK signal asserts to a TTL "1" indicating that the input power is OK and allows the power outputs to come up within <50ms later. An auxiliary V_{CC} output of $5V_{DC}$ sourcing up to 0.3A is provided for peripheral use on interface connector J10-9.

An output Enable / Disable function is provided by using an optocoupler to control the Gate IN pins of the ConverterPAC assemblies. If the Enable / Disable control pin is pulled low, the optocoupler turns on, pulling the Gate IN pin low and disabling the output. The typical delay associated for an output to come up when measured from release of the Enable / Disable pin is 5 – 10ms. The General Shut Down function controls all outputs simultaneously and works in a similar manner.

The ride-through (hold-up) time is the amount of time the load can be supported before loss of output regulation after the loss of input power. Detecting the loss of input power takes a finite time period after which the AC Power OK signal goes from a TTL "1" to "0." This signal is available for use within 1.2s after initial power-up and can be used to indicate an impending loss of power. A minimum of 3ms of warning time is given. Following the loss of input power, the outputs are disabled when the bus voltage falls below its operating threshold.

Figure 1
Mini MegaPAC architecture



Configuring and Reconfiguring MegaPACs™

Most ConverterPACs™ of the same length can be easily added, replaced or moved by sliding the assemblies in or out of a MegaPAC chassis. (Currently, the exceptions are the FinPACs™ which can only be used in the PFC MegaPAC-High Power and the UniPACs™ which can only be used in the 4kW MegaPAC). They are driver ConverterPACs and can be inserted into any available slot. For outputs greater than 200W, a driver ConverterPAC and one or more booster ConverterPACs will be used. Arrays of drivers and boosters should be configured so all boosters are placed in the slots to the immediate right of the driver when looking at the output end of the MegaPAC.

Prior to removing or installing ConverterPACs, you must remove power from the MegaPAC and wait five minutes. Failure to do so can result in personal injury or damage to the supply.

Take standard ESD precautions when handling ConverterPACs.

Removing ConverterPACs

ConverterPACs can be removed by loosening the captive screw at the base. Once this screw has been loosened, the ConverterPAC will slide out of the chassis. **Once a ConverterPAC has been removed, the empty slot MUST be filled with either another ConverterPAC or an airblock.** If the slot is left empty, it will provide an air flow escape and cause failure to the power supply.

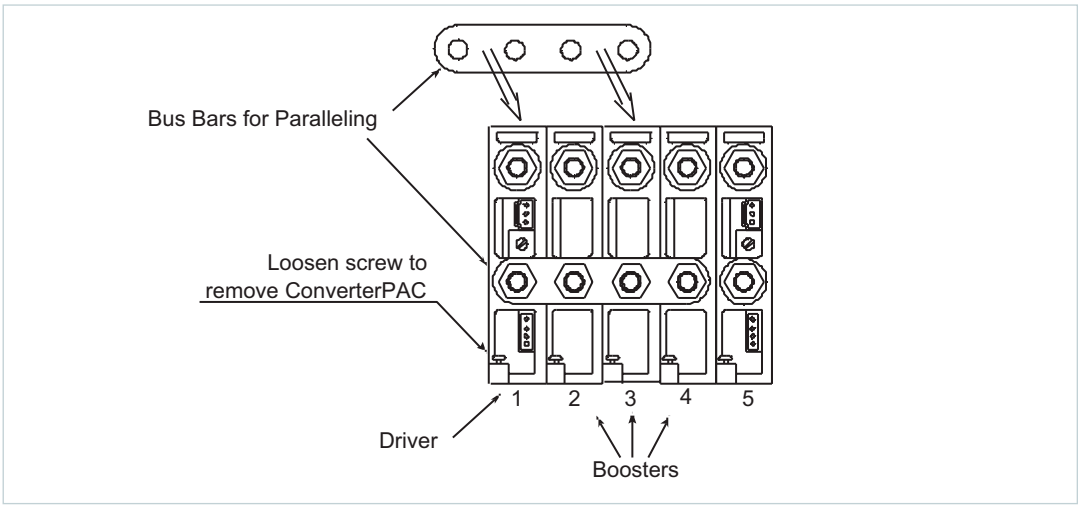
Installing ConverterPACs as Drivers

ConverterPACs can be installed in empty slots by simply sliding in the new ConverterPAC and securing the screw at the base. Torque the retaining screw to 0.23N·m [2lb·in]; do not overtighten. Power and interface connections can be made after the ConverterPAC has been installed.

Installing Booster ConverterPACs to Increase Output Power

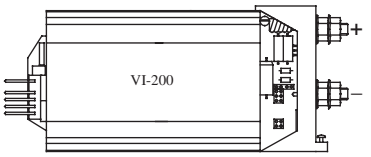
ConverterPACs can be paralleled for more power. Additional power to an output is obtained by connecting one or more boosters in parallel with a single driver. The driver can be placed in any open slot. All boosters should be inserted in the slots to the immediate right of the driver when viewed from the output end of the MegaPAC. Figure 2 shows a driver placed in slots #1 and 3 boosters placed in slots #2 – 4. After inserting the driver and boosters, they are paralleled using bus bars across the positive and negative output studs. Drivers should not be paralleled with each other. Bus bars between a driver and booster(s) should never be disconnected. (For help in identifying boosters and drivers, refer to the Part Numbering section on Page 8). Please note that total output voltage should not exceed the converter baseplate-output isolation rating of 400V. For a detailed guideline on how outputs should be placed in series, please refer to: AN:204 Creating High-Voltge Outputs.

Figure 2
Paralleling ConverterPACs



ConverterPAC™ Functional Description

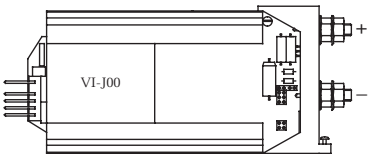
ConverterPACs are the family of slide-in output assemblies used in MegaPAC™ power supplies. Most ConverterPACs of the same length are interchangeable within a MegaPAC and between AC input MegaPAC chassis. They can be added, moved or changed as necessary. The following ConverterPACs are used in the Mini MegaPAC™.



ModuPAC

ModuPAC™

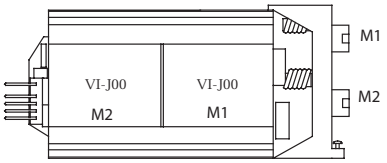
The ModuPAC output assembly consists of a VI-200™ DC-DC converter that converts the high-voltage bus to the desired regulated output voltage. Each ModuPAC can provide up to 200W of power. Multiple ModuPACs can be paralleled in a Driver-Booster configuration to provide more power. ModuPACs are fused with a PC-Tron, DC-rated, fast-acting fuse. A passive LC filter is used to reduce output ripple / noise down to 1% typical and 2% maximum peak-to-peak from 10 to 100% of rated load. An optional DC Power Good signal or output voltage Trim potentiometer can be specified. The ModuPAC contains overvoltage protection (OVP), overcurrent protection (OCP) and overtemperature limiting (OTL). The OCP has automatic recovery when the overcurrent condition is removed. The OVP and OTL are latching functions and require recycling of the AC input power to restart.



JuniorPAC

JuniorPAC™

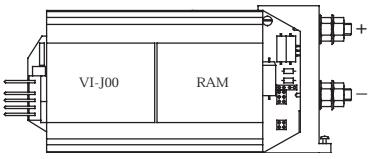
The JuniorPAC consists of a VI-J00™ DC-DC converter that converts the high-voltage bus to the desired regulated output voltage. JuniorPACs can provide up to 100W of output power and are fused with a single PC-Tron, DC-rated, fast-acting fuse. A passive LC filter is used to reduce output ripple / noise down to 1% typical and 2% maximum peak-to-peak from 10 to 100% of rated load. An optional DC Power Good signal or output voltage Trim potentiometer can be specified. The JuniorPAC contains output overcurrent protection, which recovers automatically when the overcurrent condition is removed. Overvoltage protection and overtemperature limiting are not available.



DualPAC

DualPAC™

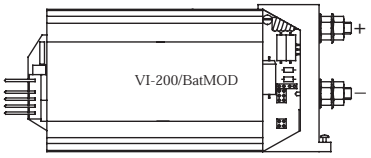
This output assembly consists of two VI-J00 DC-DC converters that convert the high-voltage bus to the desired regulated output voltages as noted above. The outputs are electrically isolated. Enabling and disabling the slot will control both outputs simultaneously.



RamPAC

RamPAC™

This output assembly consists of a VI-J00 DC-DC converter with a Ripple Attenuator Module (RAM) and is designed for applications requiring low output ripple / noise. The RamPAC can attenuate the ripple / noise down to 10mV$_{P-P}$ or 0.15% whichever is greater over a 20MHz bandwidth from 10 to 100% of rated load of the converter. RamPACs can only operate between 5 – 50V and is limited to 100W (20A).



BatPAC

BatPAC™

The BatPAC output assembly consists of a VI-200 BatMod current source that converts the high-voltage bus to the desired regulated output voltage. The converter is fused with a PC-Tron, DC-rated, fast-acting fuse. The BatPAC is a 200W programmable current source that can be configured as a battery charger. Maximum current and voltage settings are controlled using potentiometers that come as a standard feature or through Trim pin access as an option. BatPACs are available for 12, 24 and 48V battery systems.

List of ConverterPACs™ used in the Autoranging MegaPAC™ and their features							
ConverterPAC	**OVP**	**OCP**	**OTL**	**RS/AS [a]**	**LS/AS [a]**	**PG**	**TrimPot**
ModuPAC	Std	Std	Std	AS [a]	AS [a]	Opt	Opt
DualPAC	N/A	Std	N/A	AS [a]	AS [a]	N/A	Opt
JuniorPAC	N/A	Std	N/A	AS [a]	AS [a]	Opt	Opt
RamPAC	N/A	Std	N/A	AS [a]	AS [a]	Opt	Opt
BatPAC	N/A	Std	N/A	N/A	N/A	N/A	Opt

[a] See pages 11 and 14 for more information on Autosense.

OVP	Overvoltage Protection (latching)	**OCP**	Overcurrent Protection
OTL	Overtemperature Limiting (latching)	**RS**	Remote Sense
PG	Power Good (DC OK TTL Signal)	**LS**	Local Sense (replaced by Autosense)
		AS	Autosense

Note: All ConverterPACs mentioned above can be paralleled EXCEPT the DualPAC™, JuniorPAC™ and RamPAC™.

Part Numbering

Mini MegaPAC™ **mMx$_A$-1x$_B$xxxx**

e.g. MM4-143605

m = M or W

M = Mini MegaPAC Prefix

x$_A$ = number of outputs

1 = Mini MegaPAC Chassis

x$_B$ = number of modules + FlexPACs

xxxx = assigned by Vicor

ConverterPAC™ **Xx$_D$V/x$_E$Ax$_F$**

e.g. M15V/10A e.g. M15V/10ADFI e.g. D15V/6.7A-12V/8.3AT

X = ConverterPAC type (For RoHS, add G to current prefix)

M = ModuPAC (RoHS = GM) **D** = DualPAC (RoHS = GD) **R** = RamPAC (RoHS = GR) **J** = JuniorPAC (RoHS = GJ) **B** = BatPAC (RoHS = GB)

x$_D$ = Voltage out

x$_E$ = Current out (rounded to 1 decimal point)

x$_F$ = Can be multiple options (see below)

ConverterPAC options

B	Booster module	**M**	Military Grade module
D	DC OK or Power Good [b]	**P**	Preload
F	Full 50 – 110% output adjustment [c]	**R**	RAM external [d]
F1	50 – 107.5% output adjustment	**S**	Trimpot removed for external BatPAC adjustment
F2	50 – 105% output adjustment	**T**	90 – 110% output adjustment [e]
F3	50 – 102.5% output adjustment	**T1**	90 – 107.5% output adjustment
F4	50 – 100% output adjustment	**T2**	90 – 105% output adjustment
F5	60 – 110% output adjustment	**T3**	90 – 102.5% output adjustment
F6	70 – 110% output adjustment	**T4**	90 – 100% output adjustment
F7	80 – 110% output adjustment	**T5**	98 – 105% output adjustment
F8	90 – 110% output adjustment	**T6**	100 – 110% output adjustment
F9	100 – 110% output adjustment	**V1**	"VXI" low noise (150mV)15V < V_{OUT} < 24V output [f]
I	Industrial Grade module	**V2**	"VXI" low noise (50mV) V_{OUT} < 15V_{DC}
K	Custom SRF module used	**V3**	"VXI" low noise (1% ripple) for outputs > 24V

[b] **D option:** Optional for all ConverterPACs EXCEPT the DualPAC™ and BatPAC™.

[c] **F options:** Optional for all ConverterPACs EXCEPT the BatPAC and DualPAC. Trim range dependent on module type and voltage.

[d] **R option:** When using an external RAM™, components such as autosense resistors and local-sense jumpers must be removed before turning on the supply. In addition, in order to insure proper operation, sense pins must be connected either locally or remotely after the RAM's output. For further information, contact Applications Engineering.

[e] **T options:** Optional for all ConverterPACs EXCEPT the BatPAC and DualPAC. Trim Range dependent on module type and voltage

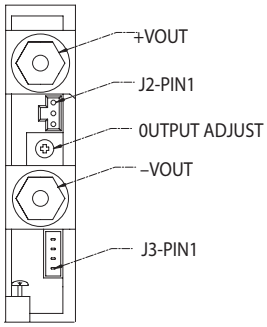
[f] **V options:** Optional ONLY on the ModuPAC™, DualPAC and JuniorPAC™. N/A on all other ConverterPACs.

ConverterPAC™ Output and Connector Pin Identification for the Mini MegaPAC™

ModuPAC™

JuniorPAC™

RamPAC™



J2 (REMOTE SENSE)

1	TRIM PIN ACCESS
2	+SENSE
3	–SENSE

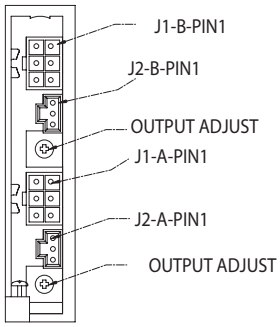
MATING HDWR:
HOUSING- MOLEX P/N: 50-57-9403
TERMINALS- MOLEX P/N: 16-02-0103
CRIMP TOOL MOLEX P/N: 63811-8700

J3 DC OK (POWER GOOD)

4	V_{CC} IN
3	POWER GOOD
2	POWER GOOD INVERTED
1	SIGNAL GROUND

MATING HDWR:
HOUSING- MOLEX P/N: 50-37-5043
TERMINALS- MOLEX P/N: 08-70-1040
CRIMP TOOL MOLEX P/N: 63828-1900

DualPAC™



J1 (OUTPUT CONNECTORS)

4	1	1 AND 4 +VOUT
5	2	2 AND 5 –VOUT
6	3	3 +R/SENSE 6 –R/SENSE

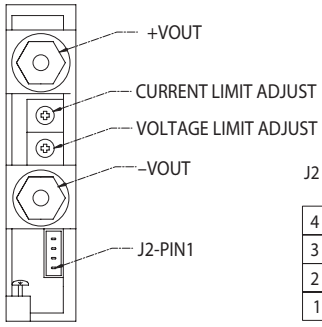
MATING HDWR:
HOUSING- MOLEX P/N: 39-01-2060
TERMINALS- MOLEX P/N: 39-00-0039
CRIMP TOOL MOLEX P/N: 11-01-0197

J2 (REMOTE SENSE)

1	TRIM PIN ACCESS
2	+SENSE
3	–SENSE

MATING HDWR:
HOUSING- MOLEX P/N: 50-57-9403
TERMINALS- MOLEX P/N: 16-02-0103
CRIMP TOOL MOLEX P/N: 63811-8700

BatPAC™



J2 (BATPAC REMOTE INTERFACE)

4	CURRENT LIMIT ADJUST
3	VOLTAGE LIMIT ADJUST
2	CURRENT MONITOR
1	–VOUT

MATING HDWR:
HOUSING- MOLEX P/N: 50-37-5043
TERMINALS- MOLEX P/N: 08-70-1040
CRIMP TOOL MOLEX P/N: 63828-1900

Note: New output studs have been installed on the ConverterPACs and are 1/8 inch longer.
Refer to page 21 for more information.

Mini MegaPAC™ Quick Install Instructions

(For Mechanical Drawing, see page 13.)

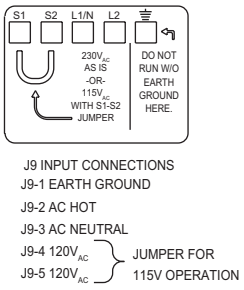
Mounting the Mini MegaPAC

- The Mini MegaPAC can be mounted on any of four sides.
- Use #8-32 or 4mm mounting screws. Maximum penetration should not exceed 0.15in [3,8 mm].
- Maintain 2in [5,1cm] clearance at either end for air flow.
- Maximum allowable torque is 20lb·in.

Input Connections

Input Power J9

- Input AC power is applied to terminal block J9 using a pressure screw terminal.
- Maximum torque is 10lb·in.
- When operating from $230V_{AC}$, verify the strapping wire (provided) has been removed from J9-4 and J9-5. Operation from $230V_{AC}$ with the strapping wire installed will damage the power supply.
- When operating from $115V_{AC}$, verify the strapping wire (provided) has been installed between J9-4 and J9-5.
- A fuse or circuit breaker is reequired in the input line for safety reasons.
- Use a maximum wire size of 10AWG with soldered terminals.



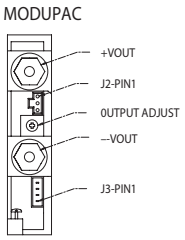
Input Panel Connectors

Output Connections

Power Connections

Installing ring lugs and/or bus bars on output studs:

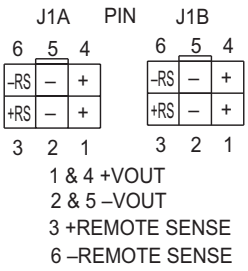
- The upper stud is Positive and the lower stud is the Return.
- Remove outer nut. Do not remove or loosen inner nut.
- Place ring lug over output stud.
- Replace and tighten outer nut to a maximum torque of **45lb·in. Do Not Over-Tighten Nuts.**
- Verify all output nuts are properly installed before turning on supply.



Single Output ModuPAC™

Installing power connectors on DualPACs (J1A and J1B):

- Use Molex mating receptacle #39-01-2060 with #39-00-0039 terminals provided.
- Pins 1 and 4 are Positive, while pins 2 and 5 are the Return.
- Attach terminals to 18 – 24AWG stranded wire using Molex tool #11-01-0197.



DualPAC™ Output Connector

Mini MegaPAC™ Quick Install Instructions (Cont.)

Sense Connections

Note: Newer power supplies have a new feature called Autosense. If remote-sense connections are not made or needed, no local-sense selection is necessary - simply hook up the output and the unit will automatically operate in local sense. If remote-sense connections are made, the unit will operate in a remote-sense mode. Remote-sense terminals should be terminated to their respective output i.e., –RS to –Output and +RS to +Output. See page 14 for more information on Autosense. **For units without Autosense, sense connections must always be made. Not connecting sense lines to their respective outputs can cause failure to the unit.**

Sense Connector

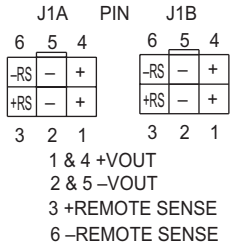


J2	Pin	
1	J2-1	Trim Pin Access
2	J2-2	+SENSE
3	J2-3	–SENSE

Sense Connector

Sense Connector J2:

- Sense connections do not have to be made if the local-sense option has been ordered.
- Use Molex mating receptacle #50-57-9403 with #16-02-0103 terminals provided.
- J2-2 is the +SENSE and J2-3 is the –SENSE.
- Attach terminals to 22 – 24AWG twisted pair wire using Molex tool #63811-8700.
- Attach opposite ends of sense lines to point where regulation is desired.
- **Verify that sense lines are not cross-connected before applying input power.**



DualPAC™ Output Connector

Sense Connections on DualPACs:

- Sense connections do not have to be made if the local-sense option has been ordered.
- Sense connections are available on the J2 connector or the J1A and J1B connectors. Either can be used.
- If using J2 connector, see more information on Page 9.
- For J1A and J1B, Pin 3 is the +SENSE and Pin 6 is the –SENSE.
- Use Molex mating receptacle #39-01-2060 with #39-00-0039 terminals provided.
- Attach terminals to 18 – 24AWG twisted pair wire using Molex tool #11-01-0197.
- **Verify that sense lines are not cross-connected before applying input power.**

Sense Connector



J2	Pin	
1	J2-1	Trim Pin Access
2	J2-2	+SENSE
3	J2-3	–SENSE

Trim Pin Connector

Trim Pin Connection J2

- The Trim J2 connection should only be made if the Trim option has not been installed. (A "T" or "F" in the ConverterPAC part number means the Trim option is installed; e.g. M5V/40AT.)
- Use Molex mating receptacle #50-57-9403 with #16-02-0103 terminals provided.
- Attach terminals to 22 – 24AWG stranded wire using Molex tool #63811-8700.
- J2-1 provides Trim access.

DC OK (Power Good)

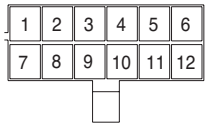


J3	Pin	
4	J3-4	V_{CC}
3	J3-3	Power Good
2	J3-2	Power Good Inverted
1	J3-1	Signal Ground

DC OK (Power Good)

DC OK (Power Good) Connection J3

- DC OK is available as an option and is only present when requested.
- J3-4 is V_{CC} IN , J3-3 is Power Good, J3-2 is Power Good inverted and J3-1 is Signal Ground.
- Use Molex mating receptacle #39-01-0043 with #39-00-0031 terminals provided.
- Attach terminals to 22 – 28AWG stranded wire using Molex tool 63828-1900.

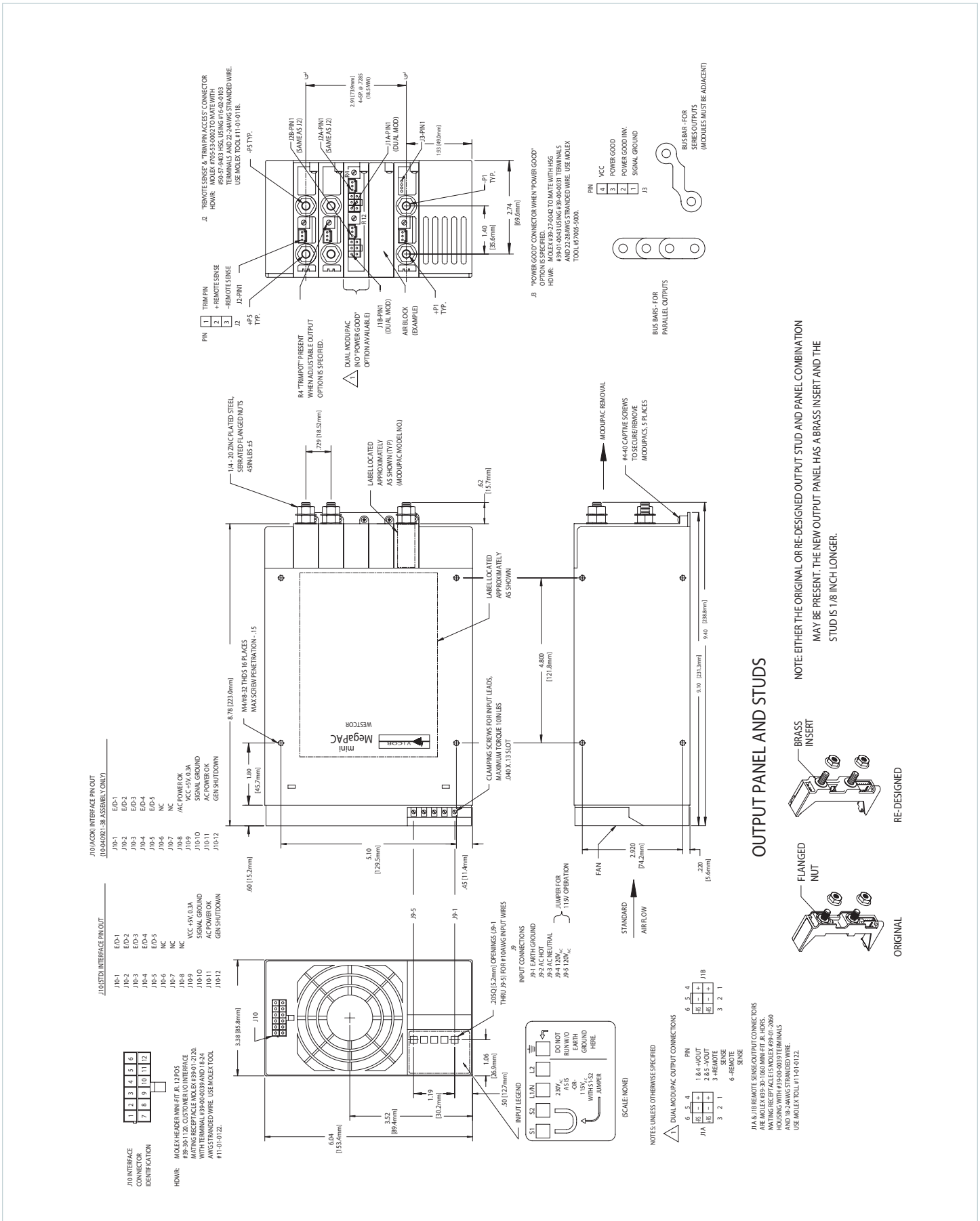


J10 INTERFACE PIN OUT

J10-1	E/D-1
J10-2	E/D-2
J10-3	E/D-3
J10-4	E/D-4
J10-5	E/D-5
J10-6	NC
J10-7	NC
J10-8	NC
J10-9	V_{CC} +5V, 0.3A
J10-10	SIGNAL GROUND
J10-11	AC POWER OK
J10-12	GEN SHUT DOWN

Interface Connections J10

- Use Molex mating receptacle #39-01-2120 with #39-00-0039 terminals provided.
- J10-1 to 8 are Enable / Disable for slots 1 – 8.
- J10-9 is V_{CC}, J10-10 is Signal Ground, J10-11 is AC Power OK and J10-12 is General Shut Down.
- Attach terminals to 18 – 24AWG stranded wire using Molex tool #11-01-0122 is General Shut Down.
- Attach terminals to 18 – 24AWG stranded wire using Molex tool #11-01-0197.


OUTPUT PANEL AND STUDS
NOTE: EITHER THE ORIGINAL OR RE-DESIGNED OUTPUT STUD AND PANEL COMBINATION MAY BE PRESENT. THE NEW OUTPUT PANEL HAS A BRASS INSERT AND THE STUD IS 1/8 INCH LONGER.
FLANGED NUT
BRASS INSERT
ORIGINAL
RE-DESIGNED
MegaPAC
VICOR
WESTCOR
J10 INTERFACE CONNECTOR IDENTIFICATION
J10 (STD) INTERFACE PIN OUT
J10 (ACOK) INTERFACE PIN OUT (10-040921-38 ASSEMBLY ONLY)
HDWR: MOLEX HEADER MINI-FIT JR. 12 POS #39-30-1120. CUSTOMER I/O INTERFACE MATING RECEPTACLE (MOLEX #39-01-3120, WITH TERMINALS #39-00-0039) 14-24 AWG STRANDED WIRE. USE MOLEX TOOL #11-01-0122.
J1A & J1B REMOTE SENSE/OUTPUT CONNECTORS ARE MOLEX #39-30-1060 (6 POS.) MATING RECEPT. ACLE'S MOLEX #39-01-2060 HOUSING WITH #39-00-0039 TERMINALS AND 18-24AWG STRANDED WIRE. USE MOLEX TOOL # 11-01-0122.
NOTES: UNLESS OTHERWISE SPECIFIED
DUAL MODUPAC OUTPUT CONNECTIONS
INPUT LEGEND
INPUT CONNECTIONS
JUMPER FOR 115V OPERATION
STANDARD AIR FLOW
FAN
MODUPAC REMOVAL
#4-40 CAPTIVE SCREWS TO SECURE/REMOVE MODUPACS, 5 PLACES
BUS BARS - FOR PARALLEL OUTPUTS
BUS BAR - FOR SERIES OUTPUTS (MODULES MUST BE ADJACENT)
"POWER GOOD" CONNECTOR WHEN "POWER GOOD" OPTION IS SPECIFIED.
HDWR: MOLEX #39-27-0042 TO MATE WITH H5G #39-01-0043 USING #39-00-0031 TERMINALS AND 22-28AWG STRANDED WIRE. USE MOLEX TOOL #57005-5000.
"REMOTE SENSE" & "TRIM PIN ACCESS" CONNECTOR HDWR: MOLEX 5-CKT PLASTIC HOUSING #50-57-9403 H5G USING #16-02-0103 TERMINALS AND 22-24AWG STRANDED WIRE. USE MOLEX TOOL # 11-01-0118.
DUAL MODUPAC (NO "POWER GOOD" OPTION AVAILABLE)
R4 "TRIMPOT" PRESENT WHEN ADJUSTABLE OUTPUT OPTION IS SPECIFIED.
1/4 - 20 ZINC PLATED STEEL, SERRATED FLANGED NUTS .45MIN I.65 ±5
M4/#8-32 THDS 16 PLACES MAX SCREW PENETRATION - .15
LABEL LOCATED APPROXIMATELY AS SHOWN (TYP) (MODUPAC MODEL NO.)
LABEL LOCATED APPROXIMATELY AS SHOWN
CLAMPING SCREWS FOR INPUT LEADS, MAXIMUM TORQUE 10IN LBS .040 X .13 SLOT
.205Ø [5.2mm] OPENINGS (J9-1 THRU J9-5) FOR #10AWG INPUT WIRES
(SCALE: NONE)
DO NOT RUN W/O EARTH GROUND HERE.
230V~ ASIS OR: 115V~ WITH S1-S2 JUMPER
8.78 [223.0mm]
5.10 [129.5mm]
6.04 [153.4mm]
3.52 [89.4mm]
3.38 [85.8mm]
4.800 [121.8mm]
9.10 [231.3mm]
9.40 [238.8mm]
2.920 [74.2mm]
2.74 [69.6mm]
2.91 [73.9mm] 4-60P @ .7285 (18.5MM)
1.93 [49.0mm]
1.40 [35.6mm]
1.80 [45.7mm]
.62 [15.7mm]
.60 [15.2mm]
.45 [11.4mm]
.220 [5.6mm]
1.06 [26.9mm]
1.19 [30.2mm]
.50 [12.7mm]
.729 [18.52mm]

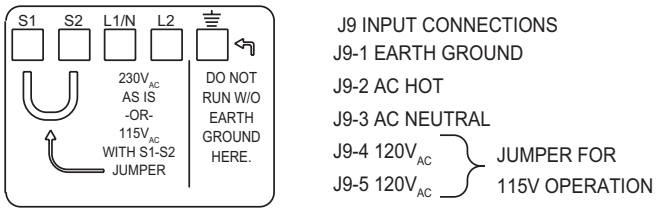
Interface Connections

Chassis Input Power Terminals (J9)

Input AC power is applied to terminal block J9 using a pressure screw terminal that accepts a maximum wire size of 10AWG. The maximum torque recommended is 10lb·in. J9-1 (GND) is Earth Ground for safety; J9-2 (L2) is the Hot connection; J9-3 (L1/N) is the other Hot or input Neutral connection. Mini MegaPACs™ are normally shipped for operation from a $230V_{AC}$ source. To operate from a $115V_{AC}$ source, a strapping wire should be connected from S1(J9-5) to S2 (J9-4). Strapping wires are included with every shipment. When operating from a $300V_{DC}$ source, remove strap.

A fault-clearing device such as a fuse or circuit breaker at the power supply input is required per safety agency conditions of acceptability. It should be sized to handle the start up inrush current.

Figure 3
Input panel connectors



Output Power Connections (+P, –P for Single Output, or J1A/J1B for Dual Outputs)

For single output ConverterPACs™, these terminals are two 1/4-20 plated steel studs. The upper stud is positive with respect to the lower stud. For dual output ConverterPACs, there is a six-pin Molex connector for each output. J1A pins 1 and 4 are the +Output, and J1A pins 2 and 5 are the –Output. Pins 3 and 6 are duplicates of the Remote Sense terminals present on J2A and J2B. Use appropriate wire size rated to handle the full output current, including short circuit levels. Avoid large current loops in output cables; run power and return cables next to one another to minimize inductive effects. All outputs are isolated and can provide positive or negative outputs.

Output +/–SENSE Connections - J2 for Single Output, or J1A/J1B for Dual Outputs

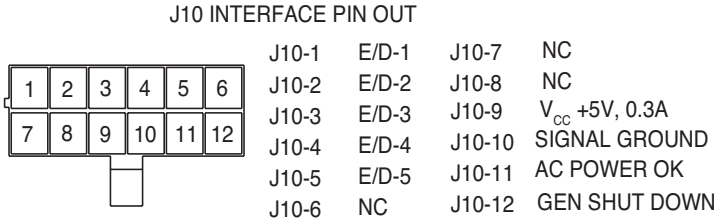
Newer power supplies have outputs configured with the Autosense feature that automatically locally senses the output if remote sense is not used. To check if an output has the Autosense feature, measure the impedance from the +OUT to +SENSE and –OUTto –SENSE pins. If the impedance is 5Ω, then the output has Autosense and does not require local-sense jumpers.

If units do not have Autosense, sense connections must be made. When making sense connections, keep in mind that although all outputs are open-Sense protected, the +/–SENSE terminals MUST be connected to their respective outputs before the MegaPAC™ is powered up. Regardless of the output polarity configured, the +SENSE should always connect to the +Power output. The –SENSE connects to the –Power output. Sense connections are not required on Booster ConverterPACs and BatPACs™. Sense pins can be accessed on J1A/J1B on dual output units.

Signal Ground (J10-10)

Signal Ground (see Figure 4 and Connector Pin Identification on Page 9) is an isolated ground reference for all J10 interfacing signals and can be used for ConverterPAC™ output status signals such as Power Good. This is not the same as Earth Ground on input power connector J9.

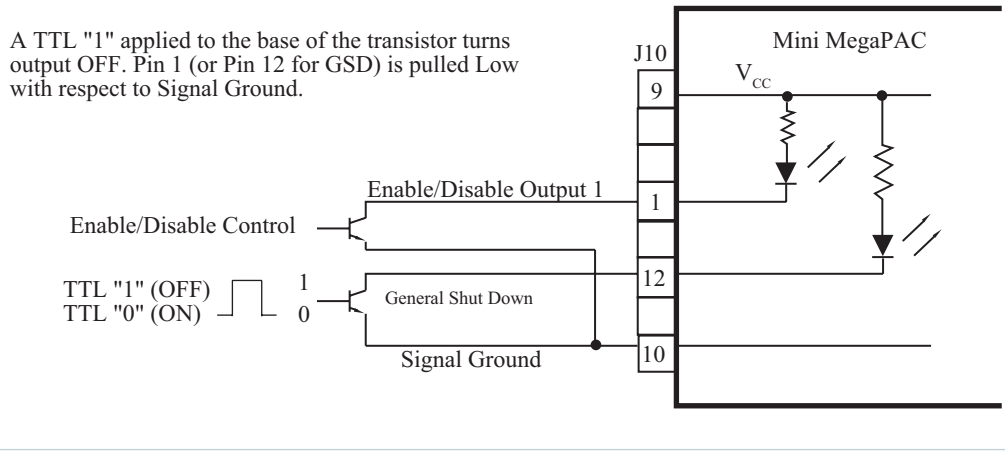
Figure 4
Interface connector (J10)



Enable / Disable (J10-1 to J10-5)

The Enable / Disable control pins allow ConverterPAC outputs to be sequenced either on or off. J10-1 through J10-5 are the control pins for output positions 1 – 5, respectively (see Figure 5 and Connector Pin Identification above). For DualPACs™, both outputs are sequenced. In parallel arrays, only the driver ConverterPAC need be controlled. The Enable / Disable pins should be pulled low to less than 0.7V with respect to Signal Ground to disable the outputs. They will sink 10mA maximum. These pins should be open circuited or allowed to exceed 4.5V when enabled. Do not apply more than 6V to these inputs at any time.

Figure 5
Enable / Disable and General Shut Down



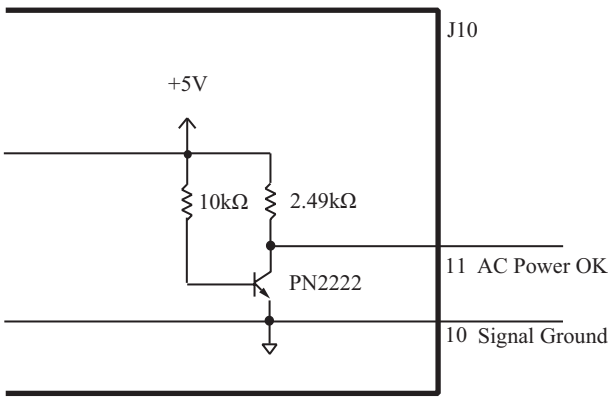
General Shut Down/GSD (J10-12)

The GSD control pin on J10-12 allows simultaneous shut down of all ConverterPAC outputs (see Connector Pin Identification on Page 9). This pin must be pulled down to less than 0.7V, and will sink 10mA maximum to shut down all outputs. The GSD pin should be open circuited or allowed to exceed 4.5V when not in use or when the outputs are to be enabled. Do not apply more than 6V to this input at any time. Normal open-circuit voltage is 1.5 – 3V with respect to Signal Ground.

AC OK / Power Fail (J10-11)

This is an active high TTL compatible signal and provides a status indication of the AC input power (see Figure 6 and Connector Pin Identification on Page 9). It is capable of sinking 20mA maximum. This signal switches to a TTL "1" when the high-voltage bus exceeds low-line condition during turn-on, and switches to a TTL "0" 3ms (minimum) before loss of output regulation due to the loss of input AC power. This signal can be used to warn external control circuits of an impending loss of power.

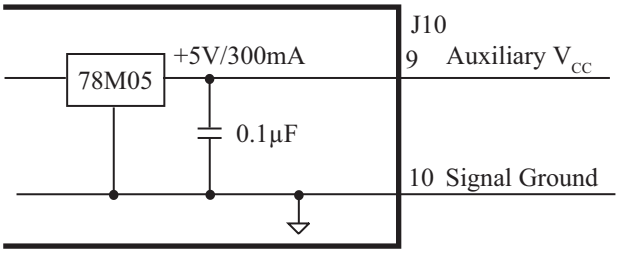
Figure 6
AC OK / Power Fail



Auxiliary V_{CC} +5V/0.3A (J10-9)

The V_{CC} on J10-9 is an auxiliary 5V regulated power source (see Figure 7 and Connector Pin Identification on Page 9). It is $+5V_{DC}$ ±5% with respect to Signal Ground and can supply 300mA maximum. It is short-circuit proof, but if shorted all outputs will shut down through the Enable / Disable circuitry. The Auxiliary V_{CC} typically powers user circuitry or is used with the Power Good circuitry to provide a pull-up reference for the outputs of the DC Power Good circuit on a ConverterPAC™. If used for this purpose, the Signal Ground on J10-10 must also be connected to the J3-1 Signal Ground pin of the ConverterPAC.

Figure 7
Auxiliary V_{CC}

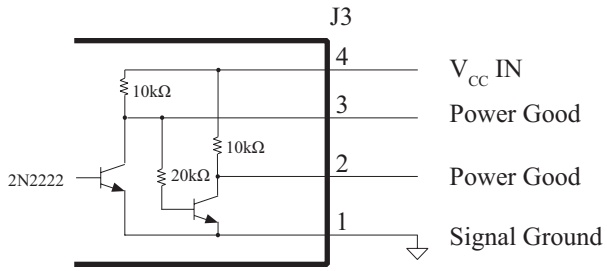


Power Good (J3-2)

The optional Power Good signal on J3-3 is referenced to Signal Ground on J3-1, and indicates the status of the output voltage. This signal is asserted a TTL "1" when the output voltage is above 95% of nominal. It is a TTL "0" when the output voltage is below 85% of nominal.

If the Trim option is also used, the Power Good trip points DO NOT track with the trimmed voltage. It is possible to trim the output below the fixed setpoints of the Power Good circuit and cause a negative Power Good signal.

Figure 8
Power Good and V_{CC}



Power Good Inverted (J3-3)

This is the inverse of the Power Good signal and is referenced to Signal Ground on J3-1.

Signal Ground (J3-1)

Signal Ground on J3-1 is an isolated secondary ground reference for J3 status signals (see Figure 8). It is used to provide a reference point for the Power Good circuitry and is not the same as Earth Ground on input power connector J9.

V_{CC} IN (J3-4)

The V_{CC} IN on J3-4 is an input that requires +5V either from the J10 Auxiliary V_{CC}, or from another source. Input current to this pin is limited by an internal resistor to 3mA. If the J10 Auxiliary V_{CC} is connected to V_{CC} IN on J3-3, then at least one J10 Signal Ground must be connected to Signal Ground on J3-1.

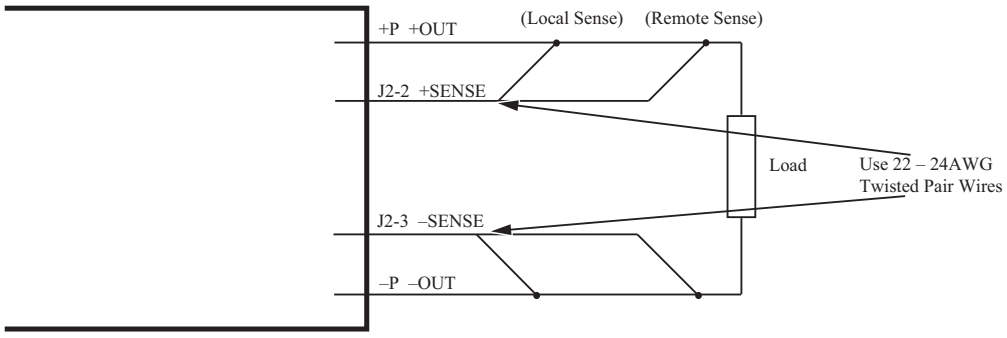
+SENSE / –SENSE (J2-2 and J2-3) (See pages 11 and 14 for more information on Autosense)

The +SENSE on J2-2 should be connected to the +Power Out, and the –SENSE on J2-3 to the –Power Out terminal. Do not reverse or leave the SENSE pins open. Sense pins can be terminated locally at the output of the power supply, in which case the power supply will provide regulation at the output terminals. The voltage appearing at the load may drop slightly due to voltage drop in the power cables. If it is necessary to compensate for voltage drop along the output power cables, this termination should be made close to the output load. Compensation of up to 0.5V (0.25V per lead) can be obtained. Use twisted pair 22 – 24AWG wire for this purpose.

For DualPACs™, the +SENSE pins are available on connectors designated as J2A-2 and J2B-2 for outputs A and B, respectively. –SENSE pins are on J2A-3 and J2B-3, respectively. These pins are also duplicated on the power connectors J1A and J1B.

Reminder: Only units with Autosense will automatically operate in local-sense mode if no sense connections are made. It will operate in remote sense mode if remote-sense connections are made. Units without Autosense MUST have sense connections (local or remote) terminated to their respective output for the unit to operate properly.

Figure 9
Sense leads



External Trim (J2-1)

Output voltage can be trimmed using an optional factory-installed Trim potentiometer or with the Trim pin (see Figure 10). The Trim potentiometer is located on the ConverterPAC™. If the Trim potentiometer has not been ordered, the Trim pin must be used. When using the Trim pin, the Trim limits are determined by the DC-DC converter used on the ConverterPAC. Maximum Trim ranges are 10% above the nominal converter voltage and 50% below the nominal converter voltage (except 10, 12, 13.8 and 15V outputs which are 10% below nominal) as measured from the output studs or output connector of the power supply.

Note: The combined effects of module trim up, remote sense and dynamic load step may cause the module to trip OVP. (See Page 19 for information on restart).

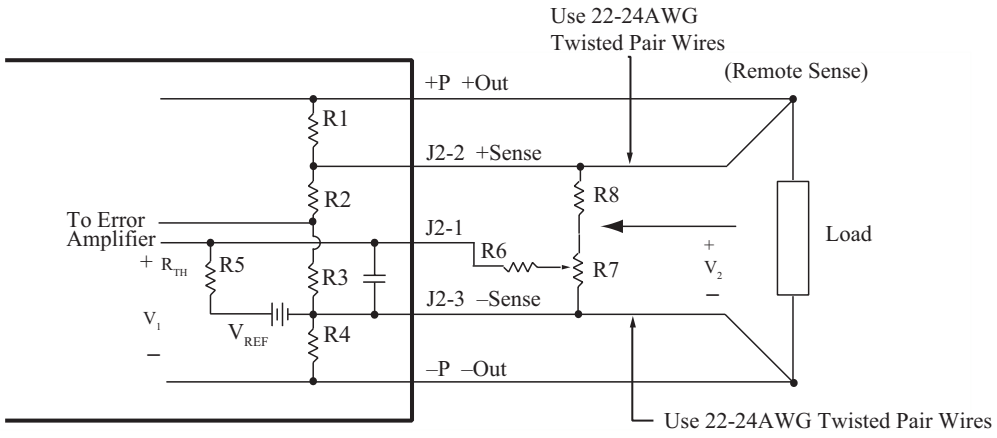
The Trim pin on J2 can be used to control the output voltage. It is referenced to the –SENSE pin on J2 and can be controlled by either a resistor network or an external voltage source. To increase an output voltage above its nominal, it is necessary to increase the voltage at the Trim pin above the internal reference voltage (V_{REF}). The reverse is true to decrease an output voltage.

Note: Converters are sometimes pretrimmed at the factory if a nonstandard output voltage is requested. Standard voltages include 2, 3.3, 5, 10, 12, 15, 24, 28 and 48V. If using a nonstandard voltage or if a ConverterPAC is ordered with a Trim option, the resistor calculations will differ from those on Page 19. Please consult the factory for assistance.

Table 1
Module internal reference voltages and Thevenin resistances

Output Module	V_{REF}	R_{TH}
VI-200™ / VI-J00™ ≥ 3.3V	2.50V	10.0kΩ
VI-200 / VI-J00 < 3.3V	0.97V	3.88kΩ

Figure 10
External trim



Example:

±10% Trim adjust on a 12V nominal output.

Figure 10 shows a typical variable Trim circuit. Using a 10kΩ trimpot (R7), the resistor values for R6 and R8 can be calculated as follows:

$\mathbf{V_1} = V_{REF} + 10\% = 2.75V$ Given: $V_{REF} = 2.5V$ (see Table 1)

$\mathbf{I_{R5}} = (2.75V - V_{REF})/R_{TH} = (2.75V - 2.5V)/10k\Omega = 25mA$

Setting the bottom limit:

$\mathbf{V_{R6}} = 2.5V - 10\% = 2.25V$

And since $I_{R5} = I_{R6} = 25mA$,

$\mathbf{R6} = V_{R6}/I_{R6} = 2.25V/25mA = 90k\Omega$

$\mathbf{V_2} = V_1 + V_{R6} = 2.75V + 2.25V = 5V$

$\mathbf{I_{R7}} = V_2/R7 = 5V/10k\Omega = 500mA$

$\mathbf{I_{R8}} = I_{R7} + I_{R6} = 525mA$

$\mathbf{V_{R8}} = (V_{NOM} + 10\%) - V_2 = 13.2V - 5V = 8.2V$ Given: $V_{NOM} = 12V$

$\mathbf{R8} = V_{R8}/I_{R8} = 8.2V/525mA = 15.62k\Omega$

Using the above resistor combination, a 12V output can be trimmed externally up to 13.2V and down to 10.8V. For further information on external trimming, refer to Chapter 5 of the Applications Manual or consult the factory for assistance.

CONSULT APPLICATIONS ENGINEERING WHEN TRIMMING OUTPUTS THAT ARE 5V OR LESS.

Specifications

Input Characterisitcs	
Input Voltage	90 – 132V_{AC}, 180 – 264V_{AC}; 47 – 500Hz; 260 – 380V_{DC}
Power Factor (Passive)	0.65 typical
Inrush Current (Cold Start)	80A peak at 115V_{AC} 80A peak at 115V_{AC}
Ride-Through Time	>20ms at nominal line, full load
Power Fail	>3ms warning
Conducted EMI	EN55022 Class A and B
Surge Immunity	EN61000-4-5 Installation Class 3, Performance Criteria B (Temporary loss of output power may occur which is self-recoverable)
Dielectric Withstand	Primary to Chassis GND = 2,121V_{DC} Primary to Secondary = 4,242V_{DC} Secondary to Chassis GND = 750V_{DC}
Output Characterisitcs	
Line/Load Regulation	0.2% max from 10 to 100% load 0.5% max from 0 to 10% load
Set-Point Accuracy	1% for standard voltages 2% for special or adjustable voltages
Ripple and Noise	Std. outputs: 2% or 100mV_{P-P}, whichever is greater, 75% min load; VXI options: V1 = (150mV_{P-P}, or less) 15V < V_{OUT} < 24V outputs V2 = (50mV_{P-P}, or less) V_{OUT} < 15V_{DC} V3 = (1% ripple or less) V_{OUT} > 24V (VXI options require 15% minimum load) RamPAC™: 10mV_{P-P}. or 0.15% whichever is greater
Output Trim Range	50 – 110% of nominal voltage VI-200™ / VI-J00™ series modules 90 – 110% of nominal voltage VI-200 / VI-J00 series modules 10 – 15V
Overcurrent Trip Point	105 – 125% of full load capability of VI-200 / VI-J00 series modules
Overvoltage Protection	ModuPAC™ 115 – 135%; N/A to DualPACs™, JuniorPACs™, BatPACs™, RamPACs™
Efficiency	82% typical
Output Power	1,000W @ 115V_{AC} or 230V_{AC} (strappable)
Environmental Characteristics	
Storage Temperature	–40 to 85°C
Operating Temperature[g]	–20 to 45°C, –20 to 65°C half power
Altitude	De-rate 2.6% total output power for each 1,000ft to a maximum operating altitude of 15,000ft. Non-operating storage maximum altitude is 40k.
Humidity	0 – 95% non-condensing
Safety Approvals	TÜV CUE Standards: CSA-C22.2 No. 60950-00, UL 60950 3rd Edition, EN 60950:2000 CE Mark to the LVD, 73/23/EEC amended by 93/68/EEC
Product Weights	6.25lbs [2,84kg] fully configured 0.7lbs [0,32kg] ConverterPAC
Warranty	2 years limited warranty. See vicorpower.com for complete warranty statement.

[g] Operating temperature is 45°C using any combination of modules and output voltages as long as the front-end rating is not exceeded. Normal de-rating applies to half power if the ambient temperature is 20°C hotter.

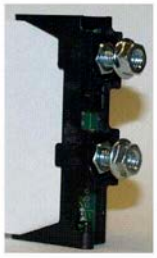
New Output Studs

New, more robust output studs (with a 3:1 safety margin at 45in·lbs.) were installed in ConverterPACs™, the slide-in assemblies used in the MegaPAC™ Family. These new outputs studs are 1/8" longer to allow for multiple lugs. They are fully compatible with the original flanged nut ConverterPACs for use in parallel arrays.

Other advantages include:

- Inner nut (that might become loose) replaced by a brass insert
- Stronger connection to the PCB
- Improved conductivity (less voltage drop and heating)
- Both the stud and panel are less likely to break due to overtorquing

Shown below are the original and redesigned studs.



Original



Redesigned

MegaPAC™ Family Connector Kit (19-130040) Listing

(Excluding 4kW MegaPAC and 4kW MegaPAC-EL™.)

Item	Qty	Description	Vendor #1	Part #
1	1	HOUSING 12 POS.165 CTR W/LATCH	MOLEX	39-01-2120
2	12	TERMINAL FEM CRIMP 18-24AWG TIN	MOLEX	39-00-0039
**		CRIMP TOOL FOR ITEM 2	MOLEX	11-01-0197
3	8	HOUSING 7 POS.098 CTR L/PROFILE	MOLEX	50-37-5073
4	8	HOUSING 4 POS.098 CTR L/PROFILE	MOLEX	50-37-5043
5	94	TERMINAL FEM CRIMP 22-18AWG PH/BRNZ	MOLEX	08-70-1040
**		CRIMP TOOL FOR ITEMS 3 & 4	MOLEX	63828-1900
6	8	HOUSING 3 POS.1 CTRS W/LATCH	MOLEX	50-57-9403
7	27	TERMINAL FEM CRIMP 22-24AWG SEL/GLD	MOLEX	16-02-0103
**		CRIMP TOOL FOR ITEM 7	MOLEX	63811-8700
** ITEMS FOR REFERENCE ONLY (NOT INCLUDED IN KIT)				

Current Share Boards – Optional Feature

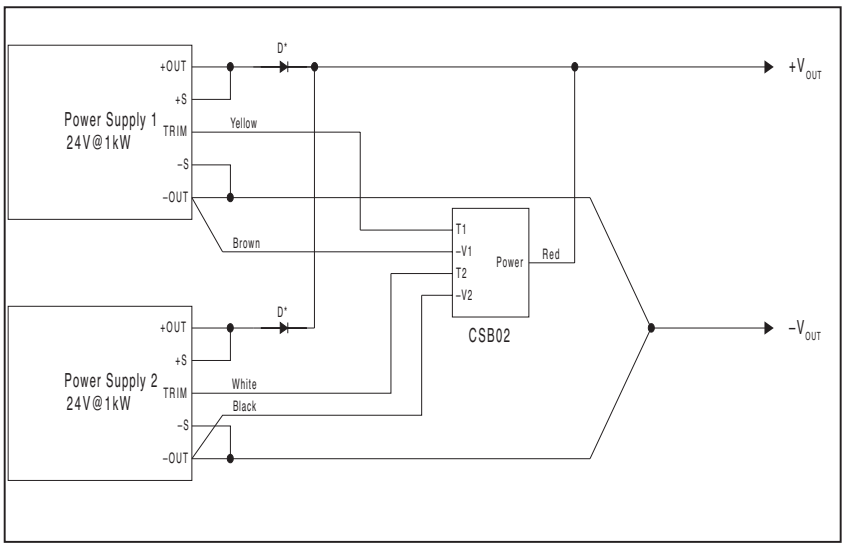
"Current Sharing" also known as load sharing, is the ability to divide the output current evenly across all active power supplies. This greatly reduces stresses on each power supply and allows them to run cooler, resulting in higher reliability. Standard "current sharing" techniques typically utilize shunt resistors or Hall-Effect devices to measure the current from each power supply. Power shunt resistors continually dissipate power and require cooling especially when dealing with high output currents of >100A. Hall-Effect devices measure magnetic fields generated by current flowing through a conductor and although they dissipate no power, they tend to be large and expensive.

First developed by Vicor Engineering for paralleling MegaPAC supplies, the box-to-box Current Share Board or CSB allows two or more Vicor power supplies to current share by utilizing the inherent voltage drop produced in the negative output return cable. This eliminates the need for additional shunt resistors or expensive Hall-Effect devices and provides a simple five wire connection method to achieve a ±1mV accuracy between the negative output power rails. This accuracy translates to a 1% current sharing if there is a total of 100mV conductional voltage drop in the negative return path.

Constructed as a current source to drive the Trim pin of a Vicor module, the design uses an accurate comparator circuit to monitor the power returns. In addition, the circuit is unidirectional and can only trim an output voltage up. The benefit is that only the supply that is supporting less current is adjusted up. This action balances the currents to the load by matching the output voltages of the supplies. In the case of one supply failing, the circuit will attempt to trim the failed supply only. This will leave the remaining functional supply alone to provide power to the load at its nominal voltage. Thus the circuit also offers simple redundancy. In addition, because CSB functions as a current source, the Trim outputs (T1 and T2) of the CSB can be placed in parallel to create a summing node. This allows current sharing between more than two supplies by paralleling the T2 output of one CSB circuit with the T1 output of the next CSB.

Please note: The CSB is not intended for use in hot-swap applications.

Figure 11
CSB interconnect example



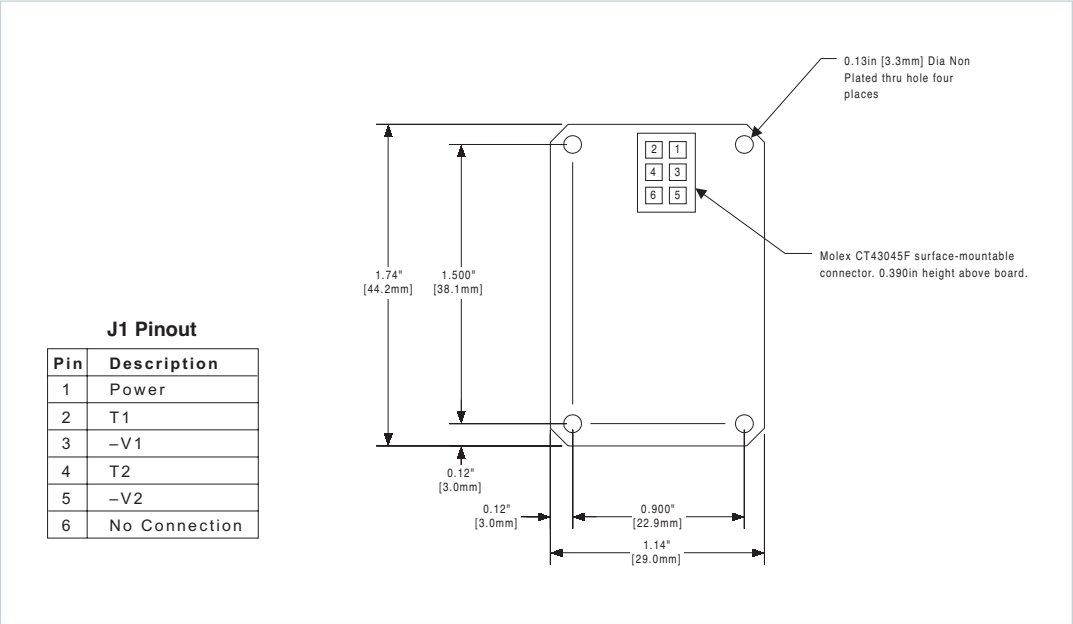
Current Share Boards – Optional Feature (Cont.)

Requirements:

1. For proper operation, the power supplies being paralleled should be enabled at the same time.
2. –OUT conductors must be of equal length and wire gauge. Separate –OUT conductors must be used from each supply to the load, or the use of a "Y" connection to a common point must be used as shown in Figure 11. Each leg of the "Y" must have a minimum of a few millivolts of drop in order for proper operation. 50 – 100mV of drop will provide from 5 to 1% accuracy.
3. –V1 and –V2 for all box-to-box circuits must be connected directly at the negative output power studs or terminals to achieve accurate current sharing.
4. D* can be added if redundancy is needed. If redundancy is not required, D* can be replaced with direct wire connections.
5. When using D*, the Power input should be connected on the cathode side of the paralleling diodes as shown in Figure 11.
6. Terminate sense leads either locally or remotely as shown in Figure 11.
7. For paralleling more than two supplies consult factory for assistance.

Current Share Boards - Optional Feature Diagram

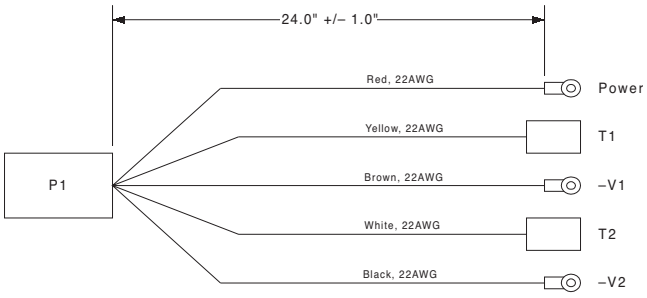
Figure 13
Mechanical drawing



J1 Pinout

Pin	Description
1	Power
2	T1
3	–V1
4	T2
5	–V2
6	No Connection

Figure 14
Cable drawing



Specifications:

1. Power: 2 – 50V_{DC} at 5mA maximum.
2. Accuracy: ±1mV between –VOUT connections.
3. Output current when not trimming up: ±1µA (VI-200 / J00), ±5µA (Maxi).
4. Use four non-plated through holes with standoffs for mounting.
5. CSB01 MUST be used for current sharing VI-200™ / VI-J00™ converters (VI-200 / J00).
6. CSB02 MUST be used for current sharing Maxi.

PLEASE NOTE, THE CSB IS NOT INTENDED FOR HOT-SWAP APPLICATIONS

Contact your Regional Applications Engineer a: apps@vicorpower.com for additional information.

Low-Leakage Version

If Low Leakage is required, the MegaPAC™ Family of Power Supplies has a model variant (must be requested). This model enables the user to meet various additional specifications. Presently, the PFC MegaPAC, Mini MegaPAC and Autoranging MegaPAC are available in Low Leakage versions. Other models can be made available. The MegaPAC Family of Power Supplies consist of:

- PFC MegaPAC™
- PFC MegaPAC High Power
- PFC MegaPAC-EL™ (Low Noise)
- Mini MegaPAC
- 4kW MegaPAC

The advantage of the Low Leakage MegaPAC power supply is in multiple power supply systems that have one AC input. This option will lower the input leakage current for these products to 500µA or less. An additional external EMI filter may be required.

How Low Leakage is Obtained

Low Leakage for the MegaPAC Family of power supplies is obtained with the removal of the "Y" capacitors from within the EMI filter of the MegaPAC as well as the "Y" capacitors on the input of the ConverterPACs. This reduces the leakage current from the AC input to AC ground (chassis) to below 500µA. At the same time, since the "Y" capacitors are a vital component of the EMI filter, without them, the EMI will go up. When this happens, the unit may no longer meet the Vicor published specifications for conducted EMI. In order to reduce the EMI to within an acceptable limit, an additional external EMI filter maybe required. All safety agency certifications for the MegaPAC Power Supplies remain intact. Contact Applications Engineering for more information.

Vicor currently has the following ConverterPACs (See ConverterPAC information sheet and/or Design Guide for more information):

VI-200™ / VI-J00™	**Maxi / Mini / Micro**
ModuPAC™ (M)	FinPAC™ (PZ)
JuniorPAC™ (J)	UniPAC™ (XU)
DualPAC™ (D)	QPAC (XQ)
RamPAC™ (R)	FinQPAC™ (PZL)
BatPAC™ (B)	
QPAC™ (L)	
DualQPAC™ (LD)	
Junior QPAC™ (LJ)	

Please note: The MegaPACs (including Low Leakage versions) are not UL 2601 or EN60601 compliant.

For more information about this or other Vicor products, or for assistance with component-based power system design, contact the Vicor office nearest you. The Vicor comprehensive line of power solutions includes modular, high-density DC-DC converters and accessory components, configurable power supplies and custom power systems. Vicor designs and builds configurable power supplies incorporating its high-density DC-DC converters and accessory components.

This product line includes:

LoPAC™ Family:

- PFC MicroS
- PFC Micro
- PFC Mini

MegaPAC™ Family:

- PFC MegaPAC™
- 4kW MegaPAC
- PFC MegaPAC (High Power)
- PFC MegaPAC (Low Noise/High Power)
- PFC MegaPAC-EL™ (Low Noise)
- Mini MegaPAC™
- ConverterPACs™

Others:

- FlatPAC-EN™

Rugged COTS versions (MI) are available for the PFC Micro, PFC MicroS, PFC Mini and PFC MegaPAC.

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